



**US Army Corps  
of Engineers**  
Rock Island District



Defense Environmental Restoration Program  
for  
Formerly Used Defense Sites  
Ordinance and Explosive Waste

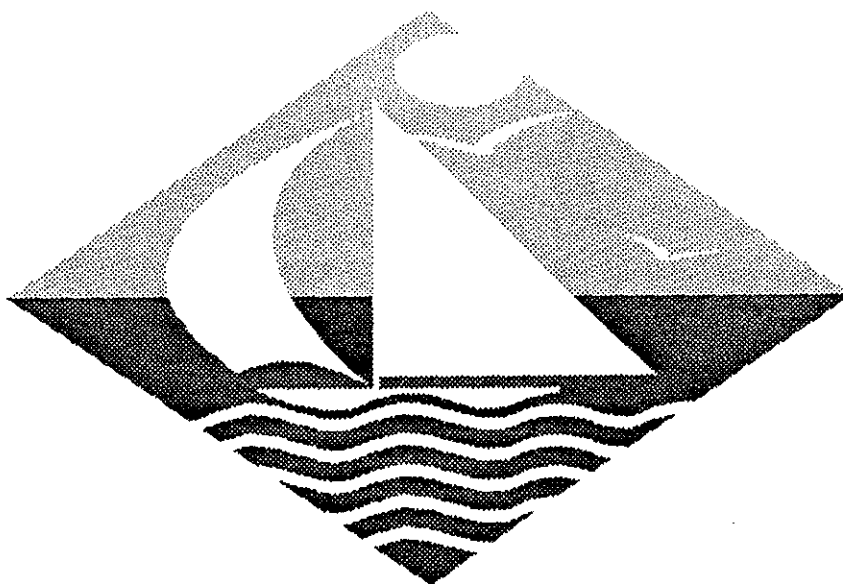
# Archives Search Report FINDINGS

for  
the former

## Butler Point AMTB Battery

Marion, Massachusetts  
Project Number D01MA050601

October 1994



DEFENSE ENVIRONMENTAL RESTORATION PROGRAM  
for  
FORMERLY USED DEFENSE SITES

FINDINGS

ORDNANCE AND EXPLOSIVE WASTE  
ARCHIVES SEARCH REPORT  
FOR  
FORMER BUTLER POINT ANTI-MOTOR TORPEDO BOAT (AMTB) BATTERY  
MARION, MASSACHUSETTS  
PROJECT NUMBER D01MA050601

October 1994

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FOR  
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1. INTRODUCTION

a. **Subject and Purpose**

(1) This report presents the findings of a historical records search and site inspection for ordnance and explosive waste (OEW) presence located at the former Butler Point Anti-Motor Torpedo Boat (AMTB) Battery, Marion, Massachusetts. See plate 1 for general location map. The investigation was performed under the authority of the Defense Environmental Restoration Program for Formerly Used Defense Sites (DERP FUDS).

(2) The purpose of this investigation was to characterize the site for potential OEW contamination, to include chemical warfare material (CWM). This was achieved by a thorough evaluation of historical records, interviews, and an on-site visual inspection.

b. **Scope**

(1) The Butler Point AMTB Battery was on leased land under government control from 1942 until 1948. The entire area has been returned to private ownership. The 4.1 acres qualified in the Findings and Determination of Eligibility (FDE) are eligible for consideration under DERP FUDS.

(2) This report presents the site history, site description, real estate ownership information, and confirmed ordnance presence, based on available records, interviews, and the site inspection. It further provides a complete evaluation of all information to assess potential ordnance contamination where actual ordnance presence has not been confirmed.

(3) For the purpose of this report, OEW is considered unwanted and abandoned ammunition or components thereof, which contain energetic, toxic, or radiological materials, and was manufactured, purchased, stored, used, and/or disposed of by the War Department/Department of Defense.

## 2. PREVIOUS INVESTIGATIONS

### a. Preliminary Assessment

A Preliminary Assessment of the Butler Point AMTB Battery was conducted by the New England Division (CENED) in 1993 (see document E-1). That report determined that the site was formerly used by the Department of War/DoD and recommended referral to CEHND for an evaluation of possible ordnance contamination. Table 2-1 represents an overview of the PA phase.

TABLE 2-1 DERP-FUDS PRELIMINARY ASSESSMENT PROJECTS				
Project Number	DERP Category	Present Phase	Comments	Location
D01MA050601	OEW	SI	Ordnance or explosive contamination	Entire site
	HTRW	-	No projects recommended	
	BD/DR	-	No projects recommended	

### b. Other Investigations:

The ASR team did not find any other previous investigations or reports on this site.

## 3. SITE DESCRIPTION

### a. Existing Land Usage

(1) The Butler Point AMTB Battery was located on a site on the tip of Sippican Neck in the town of Marion, Plymouth County, on Buzzards Bay. Most of the property is still owned by the Kittanset Golf Course from which it was leased in 1942, and remains undeveloped. Three plots are private residences. See table 3-1, table 5-1, and plate 3 for a breakdown of property ownership and current usage. See plate 5 for the approximate boundaries of the water impact area used for target practice.

TABLE 3-1 CURRENT LAND USAGE					
Area	Former Usage	Present Owner	Current Usage	Size Acres	Comments
A	Firing area (plot 32)	Kittanset Club	Undeveloped	2.14	See plate 3, photos J-2 thru J-9
	Open area (plot 8B)	Kittanset Club	Parking lot	.9	See plate 3 and photo J-10
	Barracks (plot 31)	Jesse Cunningham	Residence	1.04	See plate 3
			total	4.08	
Note: This acreage was qualified in the FDE.					

#### b. Climatic Data

(1) The climate is continental, characterized by moderately warm summers, moderately cold winters, and ample rainfall. The climate is influenced by the proximity of the Atlantic Ocean, Cape Cod Bay, and Buzzards Bay. Prevailing winds are from the west and the southwest, and the average speed is 8-10 knots December through April and 7-8 knots May through November. Winds over 40 knots have been recorded in every month, and the highest wind, 73 knots, was recorded in September.

(2) The average yearly precipitation is 47 inches. This is split evenly between the six warmer and the six colder months. Average yearly snowfall is 27 inches, with the most falling from January through March. During one bad winter, 38 inches of snow fell in March alone, with 21 inches of that occurring in a 24-hour period. Rainfall is frequent March through December, with each month averaging about 4 inches. During one wet summer, 14 inches of rain fell in September, with 9 inches of that falling in a single 24-hour period.

(3) The average annual temperature is 49 degrees Fahrenheit (F). In the warmest months (July and August), the normal high temperature is 78 degrees. In January and February, the normal low is 23 degrees. The highest recorded temperature was 99 degrees one August, while the lowest was -12 in January.

(4) The average relative humidity at noontime is 62 per cent. Humidity is higher at night, and the average at dawn is 76 per cent. In a typical year, skies are cloudy more than half the days. Heavy fog conditions (visibility  $\leq$  7 miles) exist more than half the days every month for an average of 200 days per year.

(5) Thunderstorms occur about 15 times per year, with most taking place in the summer months. Hailstorms occur once or twice a year, but the hailstones are seldom large enough to cause extensive damage. Wind and heavy rain from hurricanes cause damage about every 5 years. (One bad hurricane struck the area on September 14, 1944, severely damaging other gun sites, but Butler Point had already closed.) Strong wind and rain from coastal storms, called northeasters, are more frequent but generally do not cause serious damage. Tornadoes are rare and generally affect only small areas (refs B-15 and B-25).

#### **c. Topography**

The former Butler Point AMTB battery is on the southeastern tip of Sippican Neck. Except for the shoreline area, the entire site is level and about five feet above sea level. While the golf course and residences have planted and maintained grass, the remainder of the site is natural vegetation consisting of scrub grass, brush, and small pine trees.

#### **d. Geology and Soils**

(1) The landscape of Plymouth County owes its origin to the last continental glacier and to the rise in sea level that followed glaciation. The moving ice of the Wisconsin Stage scraped ground, picked up the bedrock of southern New England, and deposited it as glacial and post glacial sediments about 15,000 years ago. The area was periodically submerged as glaciers advanced and retreated through the region, causing sea levels to rise and fall. The area around the town of Marion, with its numerous elongated bays and inlets, was formed by the glacier's retreat to the north. Many of the bays and inlets have become sheltered from the ocean through the formation of barrier spits (ref B-33).

(2) The only type of soil found at the battery site is Gloucester loamy sand. This is an excessively drained soil formed in glacial till derived chiefly from granite. The upper part of the sub-soil is a dark yellowish-brown sandy loam, while the lower part is brownish loamy sand. There are many subangular rock fragments scattered throughout the soil material. The Gloucester soils are extremely stony except where they have been cleared for tillage (ref B-15)

(3) The gun mounts are located on the tip of the Sippican Peninsula, and wave action has caused extensive erosion since the site closed. The eastern 90mm mount has disappeared under the sand, and the high tide now reaches the base of the other 90mm mount. Various pieces of large rock and concrete have been dumped at the site to slow the erosion. In addition, sea

level in Buzzards Bay has been rising at about .8 feet per century due to the slow subsidence of the earth's crust along the northeast coast. This rate could accelerate dramatically as a result of global warming (ref B-33).

#### **e. Hydrology**

(1) There is no surface water at the battery site, but the impact area encompasses part of Buzzards Bay. The depth of the impact area ranges from 22 to 59 feet at mean low water, with the average being about 35 feet. Geologic maps indicate that bedrock is covered by silt, clay, sand, peat, and some boulders ranging in depth from 1 to 40 meters. According to an EOD technician who is also a scuba diver, the bottom generally consists of about 1 foot of silt, 3 feet of mud, and 8-10 feet of clay on top of the bedrock. Average water visibility is 3 feet in the summer and 30 feet in the winter (ref B-47, B-48, I-4, & I-5).

(2) Tidal currents and wind are the dominant circulation forces in the bay because the Elizabeth Islands protect the bay from large, long-period, open-ocean waves. Complete tidal mixing of bay water with ocean water occurs about every 10 days. Water temperatures range from a summer maximum of 72 degrees to 28 degrees in the winter. During colder winters, the upper reaches of the bay often freeze. The shallowness of the bay, combined with surface wave mixing and turbulent tidal flow, prevents strong thermal stratification, so the bay is well mixed through most of the year. There are very few large streams bringing fresh water into the bay, so the salinity offshore is essentially the same as that of other embayments such as Block Island and Vineyard Sounds. Overall, the bay is a tidally dominated, well-mixed estuarine system (ref B-33).

(3) Tides are generally of the semi-diurnal type, with two highs and two lows occurring daily in Marion Harbor. Tidal elevations, with reference to datum of mean lower low water (MLLW) equal to 0.0 feet, range from a low of 2.1 feet to a high of 6.1 feet. The mean range is 4 feet, and the mean tide level is 2.2 feet. Daily tidal information for 1994 can be found at document E-2.

(4) Tidal currents for Buzzards Bay flow twice a day, with an average speed of about 2 knots for both ebb and flood tides. The ebb direction is 035 degrees true and the flood direction is 225 degrees. Daily current information for 1994 can be found at document E-3.

#### f. Natural Resources

The Massachusetts Division of Fisheries and Wildlife provided a listing of threatened and endangered species in the area of Butler Point. This information is provided at table 3-2 (ref B-34).

#### g. Historical/Cultural Resources

The Massachusetts Historical Commission said that Butler Point has never had an archeological or historic survey. They recommended a survey be done to identify structures or sites that would be impacted should remediation occur.

TABLE 3-2 NATURAL & CULTURAL RESOURCES			
Resource Classification	Name	Federal Status*	State Rank
Vertebrates	Piping Plover	LELT	T
	Roseate Tern	LELT	E
	Common Tern	C2NL	SC
	Spotted Turtle	-	SC
	Diamondback Terrapin	-	T
	Eastern Box Turtle	-	SC
Invertebrates	Barrens Bluet	C3	T
Vascular Plants	Sandplain		
	Gerardia	LE	E
	Bushy Rockrose	3C	SC
	Plymouth Gentian	-	SC
	Bristly Foxtail	-	SC
Historical/Cultural	Not surveyed		
*Key: L-Listed, E-Endangered, T-Threatened, SC-Special Concern C-Category, NL-Not Listed			

#### 4. HISTORICAL ORDNANCE PRESENCE

##### a. Chronological Site Summary

(1) The Butler Point AMTB Battery was built in 1942 and manned by the 23d Coast Artillery Regiment. This site was one of five AMTB batteries guarding the southern entrance of the Cape



Cod Canal. The canal was a vital "short-cut" for convoys delivering supplies to England and the Soviet Union. The Cape Cod Canal protected ships from the dangerous off-shore waters as well as from the German submarines lurking in deeper water. Fort Rodman, the harbor defense command post (HDCP) in New Bedford, had 8 and 12 inch guns for defense against enemy warships, but nothing for defense against fast-moving torpedo boats until the AMTB sites were constructed (refs B-5, B-6, and B-30).

(2) Because of its location far inside Buzzards Bay and the need for replacement troops in combat areas, the battery was closed in the spring of 1944. Portions of the property continued to be leased by the Army after the war, but there was no military activity at the site. The final lease was cancelled on February 15, 1948. See paragraph 5b and table 5-2 for an explanation of real estate and leases (refs B-28, B-37, & I-2).

#### **b. Ordnance Related Records Review**

(1) Research efforts began with a thorough review of all reports, historical documents, and reference material gathered during the archival search. During this review, an effort was made to focus on areas of potential OEW contamination as described in the OEW project summary sheet as well as additional areas that were identified during the research.

(2) When the battery became operational in 1942, it had only the two 155mm M1918M1 guns on M1918A1 mount. These weapons were designed by the French in WWI and were the only effective mobile guns available for coast defense in 1942. Although this gun did not have sufficient lateral movement for use against moving targets, the Panama mount solved this problem. The Panama mount was a segment of curved rail embedded in concrete that allowed the gun's twin trails easy movement (see photos K-2 thru K-4). These 155mm guns were used until the more effective 90mm guns became available (ref B-8, B-9, and B-30).

(3) As the 90mm guns were manufactured, they were issued to AMTBs in order of priority, with the Buzzards Bay sites being number 35 on a list of 37 harbors. In 1943 the Butler Point battery received 4 90mm M1 guns, two on the M1A1 mobile mount and two on the M3 fixed mounts. Once these 90mm guns were emplaced, the 155mm guns were removed for several reasons. One was that the 90mm gun had a greater rate of fire and was much easier to traverse and elevate. Another was the fact that the 90mm guns had a secondary mission as anti-aircraft artillery (AAA). Third, the fixed 90mm mounts were located directly in front of the Panama mounts and would have blocked fire of the 155mm guns (see documents F-1, F-3, & I-2).

(4) While historical records did not indicate any practice firing at Butler Point, records from the nearby Fort Getty showed practice firing by the AMTB batteries as well as by other guns. A Marion resident confirmed that the guns at Butler Point site actually engaged in practice firing at towed water targets (see documents F-4 & I-1).

(5) A document from the National Archives shows the fields of fire for the Butler Point ATMB battery. While this indicates the battery's area of responsibility for combat firing only, it shows the water area (area C) that was likely used for target practice. Their field of fire also included some surface lands on the eastern part of the bay (area D), but it is highly unlikely this was used for target practice because of the many residences (see document L-1 and plate 5)).

(6) Training Manual (TM) 9-855 gives instructions in preparing targets and shows examples of targets for different types of practice firing. Several typical water-borne targets are shown that are likely to have been used for the Butler Point firing practice (see document D-1).

(7) The War Department's instructions for setting up AMTB batteries limited permanent construction to the gun mounts only and recommended "...localities convenient to existing housing..." It further stated "Fortifications construction at sites will be limited to the minimum essentials and in general will conform to that normally provided for mobile anti-aircraft batteries rather than the heavily protected type that is standard for fixed seacoast batteries." (see document F-1). This explains the absence of permanent facilities and the billeting in established residences. Ammo storage would likely have been in the partially buried elephant steel shelter (see document D-5).

#### **c. Interviews With Site-Related Personnel**

(1) The team spoke with many local residents to obtain information about the Butler point. All of the older individuals knew that it had been a gun site during the war, but no one was able to provide any specific information. Mr. H. Edmund Tripp, the town historian, related that the soldiers used the golf course club house as a barracks and mess hall. He had heard that they did practice firing at floating targets, but he speculated that any firing would have been very infrequent, as Buzzards Bay was a major staging area for convoys taking supplies and troops to Europe (see document I-7).

(2) Mr. Albert Serpa was a teen-ager in Marion during the war. He knew where the battery was, and said the roads were blocked and site was guarded. He recalled that the harbormaster

used to post warnings at certain times so the boats wouldn't go out in the bay during practice firings. Mr. Serpa said the guns fired at targets out in the water but he didn't recall how far out in the bay these targets were (see document I-1).

(3) COL Alex Holder (retired field artillery) is a coastal defense historian who has visited the Butler Point site as well as similar sites all over the country. COL Holder described the typical layout of an AMTB battery, and theorized that the battery did very little practice firing because of the heavy ship traffic in Buzzards Bay (see document I-2).

(4) Mr. George Jennings has been the Marion harbormaster for over 30 years and has worked on Buzzards Bay for over 50 years. He knew of the Butler Point site but had no information on its wartime history. Mr. Jennings was unaware of anyone finding WWII ordnance anywhere in the bay, though he had heard of a depth charge found near Woods Hole in Vineyard Sound. He said that fishermen are not allowed to use nets in Buzzards Bay, though he added that scallopers use scoops to drag the bottom. He said there was little dredging in the bay other than what the Corps does, and he never heard of any ordnance being dredged up. Mr. Jennings knew nothing about practice firing, but he did say that there was a large amount of ship traffic during the war (see document I-4).

(5) TSGT Mike Perra is an EOD technician at Otis AFB on nearby Cape Cod. He has never heard of any projectiles being recovered from Buzzards Bay or its vicinity. Senior Chief Jack Ramsey is the Navy EOD supervisor at Newport News, and he too is unaware of any projectiles found in the area. Officer John Philbrook of the Marion Police Department had also never heard of recovered projectiles (see documents I-5, I-6, & I-10).

(6) Mr. Lennie Blodgett has been the superintendent of the Kittansett Gold Club for 32 years. He is totally unaware of any remnants of the battery other than the concrete mounts, and said the soldiers used the clubhouse and private houses for barracks. He has never come across ordnance or anything hazardous from the site. Mr. Jesse Cunningham owns the house adjacent to the battery and knew that it had been used for troop housing during the war. He is unaware of any one ever finding any ordnance from the site (see documents I-8 & I-9).

(7) Mr. Duben Montoya works for the Corps of Engineers and supervised dredging in the Clevelan Channel. He has never heard of any ordnance being dredged up. Mr. Dennis Runsberg of the National Ocean Survey stated that suspected ordnance is marked on navigation charts and that none is known of in Buzzards Bay (see documents I-11 & I-12).

## 5. SITE ELIGIBILITY

### a. Confirmed Formerly Used Defense Site

(1) Former land usage by the War Department was previously confirmed for the site as summarized in section 4a of this report. The site was used by the Army as an AMTB battery.

(2) The final lease was terminated on February 15, 1948, thereby ending all Army control of the site (see document G-2).

### b. Potential Formerly Used Defense Site

(1) Following personal interviews and historical research, the ASR team concluded that the FUDS-eligible acreage is greater than the 4.1 acres (area A) qualified in the FDE. Most of the additional acreage is the impact area in Buzzards Bay (area C), while a small amount (the 4.26 acres of area B) is adjacent to the previously qualified site (see plates 4 & 5).

(2) As noted in paragraph 4b, the battery engaged in practice firing out into Buzzards Bay. This impact area (area C, 36,728 acres) is shown on plate 5. Also shown on plate 5 is the combat field of fire area (area D, 30,886 acres) that was not used for practice firing.

(3) Although an area of 4.1 acres is specifically stated in document F-2, this appears to be a partial figure. Document G-1 is the only map found that delineated the site border (the broken line), and this border matches the current ownership plat map shown as document G-3 and plate 3. The previously qualified plots 8B (.9 acres), 31 (1.04 acres), and 32 (2.14 acres) add up to the 4.1 acres (4.0814 to be exact) of area A. Including plots 8, 8A, 29, and 30 (area B, which includes the barracks areas) adds an additional 4.26 acres and matches the border in document G-1. The correct acreage for the battery site, areas A and B, is 8.34 acres. Table 5-1 provides ownership information on the areas of potential FUDS.

TABLE 5-1 POTENTIAL FUDS SITES					
Area	Former Usage	Present Owner	Current Usage	Size Acres	Comments
<b>B</b>	Open area (plot 8)	Kittanset Club	Pro shop	.69	See plates 2 & 3
	Barracks & mess (plot 8A)	Kittanset Club	Clubhouse	1.84	See plates 2 & 3, photo J-10
	Barracks (plot 29)	Drake Trust	Residence	.52	See plates 2 & 3
	Barracks (plot 30)	Butler Trust	Residence	1.21	See plates 2 & 3
			area B total	4.26	
<b>C</b>	Impact Area	N/A	Water	36,728*	See plate 5
<b>D</b>	Field of Fire (combat)	Unknown	Residential & water	30,886*	See plate 5
area D does not require qualification					
* indicates approximate acreage					

(4) The search for the precise land acreage was hampered by the absence of leases. Although historical documents made reference to leases and acreage, the only real estate document found was for terminating a .47 acre lease in February of 1948 (see document G-2). A 31 March 1947 map did not show site boundaries and noted "No limits to area leased designated" (see document L-2). Table 5-1 provides a summary of the real estate history.

TABLE 5-2  
SUMMARY OF REAL ESTATE HISTORY

DATE	ACTION	COMMENTS
Nov 17, 42	Formal lease signed, no acreage specified (F-2)	Probably the entire 8.34 acres shown in doc G-1
Jul 1, 43	Map (G-1) w/border showing entire site	Only map with site boundary
Spring, 44	Site closed (ref B-37)	Probably only the 4.26 acres of area B declared excess at this time
Oct 23, 45 (memo date)	Refers to 4.1 acre lease cancelled Dec 1, 1944 (F-2)	Probably the 4.1 acres of area A
May 1, 46	Refers to .12 acres as not surplus (F-2)	Probably the gun blocks only
Mar 31, 47	Map shows gun blocks but no boundaries (L-2)	Probably the gun blocks only
Feb 15, 48	Doc G-2 indicates lease for .47 acres terminated	End of Army control, probably gun blocks and surrounding land

## 6. VISUAL SITE INSPECTION

### a. General Procedures and Safety

(1) During the period of 3-5 August 1994, members of the Assessment Team traveled to the former Butler Point AMTB Battery. The primary task of the team was to assess OEW presence and potential due to its former usage as a firing range. Site inspection was limited to non-intrusive methods; i.e. subsurface sampling was not authorized or performed.

(2) Real estate rights-of-entry were not obtained by the team due to the willingness of the current owner to allow the team to visit his property. As such, control and jurisdiction of the site remained with the owner during this inspection.

(3) A site safety plan was developed and utilized by the assessment team to assure safety from injury during the site inspection of this facility. Prior to the inspection, a briefing was conducted which stressed that OEW should only be handled by military EOD personnel (ref B-27).

(4) Prior to the site visit, a thorough review of all available reports, historical documents, texts, and technical ordnance reference materials gathered during the historical records search portion was made to ensure awareness of potential ordnance types and hazards.

(5) The team consisted of Ronald Plante and Michael LaForge. The team visited Butler Point on 5 August. The property owner gave verbal permission for the team to enter his land.

**b. Areas A and B: Gun Site and Barracks**

(1) At the firing point, two of the 155mm Panama mounts remain, as does one of the 90mm mounts (see photos J-2 through J-6). The 2nd 90mm mount has been buried by the sand (see photo J-7). There is nothing remaining of the battery commander (BC) station, ammo storage facilities, or the 90mm mobile mounts (see photos J-7 and J-9). The team did find some of the concrete support pillars for the BC station (see photo J-8). The shoreline did not reveal any other traces of the battery, even at low tide (see photos J-1 and J-11). There were pilings from the yacht club pier which was washed away in the 1944 hurricane which occurred after the site closed (see photo J-1).

(2) Some of the firing point is short grass (see photos J-6 & J-7), while another section has heavier growth (see photo J-9). Team members walked through short grass, tall grass, brush, and trees without finding any evidence of the temporary structures other than small pieces of wood and strands of wire. There was no OEW observed around the firing point.

(3) Away from the firing point, the golf course and the residences have seeded and maintained the grassy areas (see photo J-10). There was no OEW observed anywhere in these areas or near the clubhouse and pro shop.

**c. Area C: Impact Area (Field of Fire - Water)**

This is the part of the field of fire most likely used for practice firing. The team viewed this area from the shore only and did not observe any OEW (see plate 5).

**d. Area D: Field of Fire (Land & Water)**

This is the combat field of fire toward inhabited areas that was not likely used for practice firing. The team viewed this area from the shore only and did not observe any OEW (See plate 5).

## 7. EVALUATION OF ORDNANCE HAZARDS

### a. General Procedures

(1) Each subsite was evaluated to determine confirmed, potential, or uncontaminated ordnance presence. Confirmed ordnance contamination is based on verifiable historical evidence or direct witness of ordnance items. Verifiable historical record evidence consists of ordnance items located on site since site closure and documented by local bomb squads, military Explosive Ordnance Demolition (EOD) Teams, newspaper articles, correspondence, and current findings. Direct witness of ordnance items consists of the site inspection team directly locating ordnance items by visual inspection. Additional field data is not needed to identify a confirmed site.

(2) Potential ordnance contamination is based on a lack of confirmed ordnance presence. Potential ordnance contamination is inferred from records or indirect witness. Inference from historical records would include common practice in production, storage, or disposal at that time which could have allowed present day ordnance contamination. Potential ordnance contamination could also be based on indirect witness or from present day site features. Additional field data is needed to confirm potential ordnance subsites.

(3) Uncontaminated ordnance subsites are based on a lack of confirmed or potential ordnance evidence. There is no reasonable evidence, either to direct or inferred, to suggest present day ordnance contamination. Additional field data is not needed to assess uncontaminated ordnance subsites.

### b. Areas A and B: Gun Site and Barracks

(1) Based on materiel collected during the ASR, the gun site and barracks areas are considered **uncontaminated** with OEW. This is based on interviews with local residents, coast defense historians, law enforcement officials, and EOD personnel. Although there was artillery ammunition stored at (and fired from) the site, there is no evidence that any ordnance remains there. None of the local residents had ever found anything, nor did the team hear any stories of buried ordnance. There is absolutely nothing to indicate or even imply that any ordnance was left behind, and none was observed during the site visit.

(2) The site was closed in the spring of 1944, long before WWII ended when the soldiers would have been in a rush to get discharged and sent home. If anything, the soldiers were not in a hurry to leave, as many were going overseas into combat after reasonably easy duty. None were being discharged. There



was likely ample time to transfer the ammo to other sites or return it to the headquarters at Fort Rodman in New Bedford.

**c. Area C: Impact Area (Field of Fire - Water)**

The impact area is considered as **potentially contaminated**, based on interviews, historical data, and common practice at similar batteries. Although practice firing would not have been frequent because of the heavy ship traffic in the bay, there is enough evidence to conclude that the guns were fired at towed targets in the water. The guns may have fired inert training rounds and/or high explosive (HE) ammunition, and some of the HE rounds may have failed to explode and could be sitting in the mud beneath the waters of the bay. The dimensions of the impact area are based on the maximum range of the projectiles, as no map was found to specify the area. The field of fire map was for combat firing (which never took place) and not for training use.

**d. Area D: Field of Fire - Land & Water**

This area is considered as **uncontaminated** based on interviews and logical conclusion. This was part of Butler Point's designated field of fire in combat, and there is little doubt the presence of downrange residences would have stopped the battery from firing at enemy vessels. However, there is no reason to conclude that they would have used this area for target practice firing. In addition, EOD technicians have never found any projectiles in this area.

**8. SITE ORDNANCE TECHNICAL DATA**

**a. End Item Technical Data**

Table 8-1 is a listing of all the ammunition that may have been fired from the Butler Point AMTB battery. It includes the typical rounds that would have been fired at the waterborne targets under normal training conditions. The table includes both training and service rounds as there is no information available on which type of ammunition was fired. No evidence exists to indicate that chemical warfare material was stored at this battery.

TABLE 8-1 AMMUNITION USED AND EXPLOSIVE/CHEMICAL FILLER			
ITEM	MODEL	FILLER/WEIGHT	FUZE
90mm	Shell, HE, M58	2.67# TNT or 2.22# ammonal	MT M43
	Shell, HE, M71	2.04# TNT or ammonal	MT M43 PD M48
	Shell, practice, M71	Inert	Inert M48A1 or dummy M73
	Shot, AP, M77 w/tracer	.01# tracer element	None
	Projectile, APC, M82, w/tracer	.44# Explosive D	BD M68
155mm	Projectile, AP, M112	1.44# Explosive D	BD M60
	Projectile, HE, M101	15.56# TNT	PD M51 or MT M67
	Shell, HE, Mk IIIA1	15.21# TNT	PD M51 or MT M67
	Shell, TP, M101	Sand-filled	Inert
<b>37mm subcaliber projectiles</b>			
	Shell, practice, M92	.1# black powder	PD M74
	Shell, practice, M63	.1# black powder	Base, M58, practice
	Shell, practice, Mk. IIA1	.1# black powder	Base, M38, practice
Note: Data is based on typical ammunition of the period. No OEW has ever been found attributed to this site.			

#### b. Chemical Data of Ordnance Fillers

Table 8-2 provides a summary of the chemical data for the projectiles that may be found in the impact area. Drawings of some of the items can be found at Appendix D.

TABLE 8-2  
CHEMICAL DATA OF ORDNANCE FILLERS

Explosive Material	Synonyms	Chemical Compounds
TNT	2,4,6-trinitrotoluene	$C_7H_5(NO_2)_3$
Explosive D (Ammonium Picrate)	Ammonium 2,4,6-trinitrophenolate	$C_6H_2(NO_2)_3NOH_4$
Ammonal (67% TNT, 22% ammonium nitrate, 11% flaked aluminum)	See above for TNT AN	See above $NH_4NO_3$  Al
Black powder 74% Potassium Nitrate 11% Sulphur 16% Charcoal	Salt Peter, Niter	$KNO_3$ S C

## 9. OTHER ENVIRONMENTAL HAZARDS

### a. Hazardous, Toxic, and Radiological Waste

The ASR team did not find any evidence of underground storage tanks or HTRW. There are no HTRW projects recommended.

### b. Building Demolition/Debris Removal

The only structures remaining are the four gun mounts, one of which is buried in the sand. These are not recommended as BD/DR projects.

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APPENDIX A

REFERENCE SOURCES

# REFERENCE SOURCES

The following organizations and personnel are acknowledged for their support.

Organization	Name	Telephone	Nature of Support
--------------	------	-----------	-------------------

## GOVERNMENT SOURCES

### FEDERAL AGENCIES

#### Department of Defense

##### Headquarters

Defense Technical  
Info Center  
Alexandria, VA22304

Ms. Judy Skupien

(815) 273-8771

No information

Defense Libraries  
On Disk  
Washington, DC 20319

Ms. Judy Skupien

(815) 273-8771

No information

Defense Logistics  
Studies Info  
Exchange  
Ft Lee, VA 23801

Ms. Jacqueline Bey

(815) 273-8772

No information

#### U.S. Army

US Army Corps of  
Engineers, Cape  
Cod Canal Office  
Buzzards Bay,  
MA 02532

Ranger Mark Hagen

(508) 759-4431

Historical  
photographs

US Army Corps of  
Engineers  
New England Div  
Waltham, MA 02254

Mr. Duben Montoya

(617) 647-8377

Dredging  
information

US Army Ordnance  
Museum  
APG MD 21005

Ms. Leslie Smith

(410) 278-3602

No information

# REFERENCE SOURCES

Organization	Name	Telephone	Nature of Support
GOVERNMENT SOURCES			
FEDERAL AGENCIES (continued)			
Department of Defense (continued)			
U.S. Army (continued)			
Center of Military History ATTN: DAMH-RAS 1099 14th ST NW Wash DC 20536	Ms. Hannah Zeidlank	(202) 504-5416	No information
US Army Corps of Engineers Office of History Alexandria, VA 22310	Dr. Martin Gordon	(703) 355-3558	Historical data
National Personnel Records Center 9700 Page Ave St Louis, MO 63132	Mr. Bill Seibert	(314) 538-4085	No information
US Army Military History Institute Carlisle Barracks Carlisle, PA 17013	Ms. Louise Russell	(717) 245-3611	Referral
AMCCOM Historical Office Rock Island, IL 61299	Dr. Herb LaPore	(309) 782-1450	Referral

# **RERERENCE SOURCES (continued)**

Organization	Name	Telephone	Nature of Support
<b>FEDERAL AGENCIES (continued)</b>			
<b>Department of Defense (continued)</b>			
<b>US Army (continued)</b>			
Rock Island Arsenal Museum Rock Island, IL 61299	Mr. Dan Whitman	(309) 782-5021	Coast defense newsletter
Army Safety Mgmt Info System Ft Rucker,AL 36322	Ms. Cindy Ballard	(815) 273-8744	No information
<b>US Air Force</b>			
Air Weather Service National Climatic Data Center Asheville,NC 28801	Ms. Janet Wall	(704) 271-4218	Climatological data
102nd EOD Flight Otis ANGB,MA 02542	TSGT Mike Perra	(508) 968-4861	Interview
<b>US Navy</b>			
Portsmouth Naval Shipyard Code: 870H Portsmouth, NH 03801	Mr. Jim Dolph	(207) 438-3550	No information

**REFERENCE SOURCES (continued)**

Organization	Name	Telephone	Nature of Support
<b>FEDERAL AGENCIES (continued)</b>			
<b>Department of Defense (continued)</b>			
<b>US Navy (continued)</b>			
US Naval Institute 118 Maryland Ave Annapolis, MD 21402	Ms. Ann Hassinger	(410) 268-6110	Magazine articles
US Naval War College Library 686 Cushing Road Newport, RI 02841	Dr. Cherpak	(401) 841-4551	No information
EOD Mobile Unit 2 Newport, RI 02841	Senior Chief Jack Ramsey	(401) 841-3301	Interview
<b>General Services Administration</b>			
<b>National Archives</b>			
New England Region 380 Trapelo Road Waltham, MA 02154	Mr. Stan Tozeski	(617) 647-8100	No information
Cartographic & Architectural Br 8601 Adelphi Road College Park, MD 20740	Mr. James Martin	(301) 713-7028	No information from record groups 30, 71, 77, & 92.
Military Ref Br Penn Ave & 7th St Wash, DC 20408	Mr. Richard Peuser	(202) 501-5385	Data found in RG 407. No info in RG 18, 107, 153, 160, 341, & 394.



# REFERENCE SOURCES (continued)

Organization	Name	Telephone	Nature of Support
<b>FEDERAL AGENCIES (continued)</b>			
<b>General Services Administration (continued)</b>			
<b>National Archives (continued)</b>			
Suitland Ref Br 4205 Suitland Rd Suitland, MD 20409	Ms. Terri Hanna	(301) 763-7410	No info found in RG 156 or 338.
<b>Department of the Interior</b>			
Region 5 300 Westgate Rd Hadley, MA 01035	Mr. Don Frickie	(413) 253-8568	No information
Nat Park Service 15 State St Boston, MA 02109	Mr. Richard Torngau	(617) 223-5199	No information
US Geological Survey Woods Hole, MA 02543	Mr. Dave Twitchell	(508) 548-8700 x266	Topographical data
<b>Department of Agriculture</b>			
Soil Conservation Service 15 Cranberry Hwy Wareham, MA 02576	Mr. Peter Bonome	(508) 295-7962	Soil survey and aerial photos

**REFERENCE SOURCES (continued)**

Organization	Name	Telephone	Nature of Support
<b>FEDERAL AGENCIES (continued)</b>			
<b>Environmental Protection Agency</b>			
Regional Office JFK Federal Bldg Boston, MA 02203	Ms. Judy Reynolds	(617) 565-3300	No information
Buzzards Bay Coalition 2 Spring Street Marion, MA 02738	Ms. Bernadette Taber	(508) 748-1590	Environmental plan
<b>Department of Commerce National Oceanic and Atmospheric Administration</b>			
Woods Hole Oceanographic Institution Woods Hole, MA 02543	Mr. George Hampson	(508) 548-2655	Referral
National Ocean Survey, Map Br 1315 East West Hwy Silver Spring, MD 20910	Mr. Dennis Runsberg	(301) 713-2735	Chart information
<b>STATE AGENCIES</b>			
Mass Historical Commission 80 Boylston St Boston, MA 02116	Ms. Judith McDonough	(617) 727-8470	Historical/cultural information

**REFERENCE SOURCES (continued)**

Organization	Name	Telephone	Nature of Support
<b>STATE AGENCIES (continued)</b>			
Mass Division of Wildlife 100 Cambridge St Boston, MA 02202	Ms. Ann W. Kelly	(617) 727-9194	Endangered species data
Mass Maritime Academy 2 Academy Drive Buzzards Bay, MA 02532	Ms. Arlene Cardoza	(508) 830-5000	No information
State Library of Massachusetts 341 State House Boston, MA 02133	Ms. Kim	(617) 727-2590	No information
Massachusetts Historical Society Library 1154 Boylston St Boston, MA 02215	Ms. Virginia Smith	(617) 536-1608	Referral
<b>REGIONAL CITY AGENCIES</b>			
New Bedford Historical Assn 2 Spring St New Bedford, MA 02742	Ms. Karen Scofield	(508) 997-1776	Referral

**REFERENCE SOURCES (continued)**

Organization	Name	Telephone	Nature of Support
<b>LOCAL CITY AGENCIES</b>			
Marion Executive Secretary 2 Spring St Marion, MA 02738	Mr. Ray Pickles	(508) 748-3550	No information
Marion Assessor 2 Spring Street Marion, MA 02738	Ms. Catherine Gibbs	(508) 748-3510	Real estate information and referrals
Marion Historian PO Box 134 Marion, MA 02738	Mr. H. Edmund Tripp	(508) 748-0088	Interview
Marion Police Dept 20 Spring Street Marion, MA 02738	Off John Philbrook	(508) 748-1212	Interview
Marion Harbormaster 2 Spring Street Marion, MA 02738	Mr. George Jennings	(508) 748-3535	Interview

**REFERENCE SOURCES (continued)**

Organization	Name	Telephone	Nature of Support
<b>REGIONAL PUBLIC LIBRARIES</b>			
New Bedford Library 550 Pleasant St New Bedford, MA 02742	Mr. Paul Ceyer	(508) 991-6275	Referral
Wareham Library 400 Cranberry Hwy Wareham, MA 02571	Ms. Susan Pizzolato	(508) 295-2343	No information
<b>LOCAL PUBLIC LIBRARY</b>			
Marion Library 8 Spring St Marion, MA 02738	Ms. Judith Kleven	(508) 748-1252	Referral
<b>NON-GOVERNMENT SOURCES</b>			
<b>REGIONAL NEWSPAPERS</b>			
New Bedford Standard-Times 555 Pleasant St New Bedford, MA 02742	Ms. Gail Couture	(508) 979-4436	Historical articles
<b>LOCAL NEWSPAPERS</b>			
Marion Sentinel 238 Wareham Road Marion, MA 02738	Ms. Linda Ahlbord	(508) 748-1123	Referral

**REFERENCE SOURCES (continued)**

Organization	Name	Telephone	Nature of Support
<b>NON-GOVERNMENT SOURCES (continued)</b>			
<b>REGIONAL INDIVIDUALS</b>			
19 Harbor Hts Rd Scituate, MA 02066	COL Alex Holder	(617) 545-1290	Interview
20 Somerset St Boston, MA 02108	Mr. Alfred Schroeder	(617) 727-5250	Referral
12 Colby Way Nahant, MA 01908	Mr. Gerry Butler	(617) 593-7037	Referral
New Bedford, MA	COL Sam Wagstaff	(508) 998-1953	No information
<b>LOCAL INDIVIDUALS</b>			
375 Front St Marion, MA 02738	Albert Serpa	(508) 748-1413	Interview
2 Spring St Marion, MA 02738	Mr. Dennis Lattrell	(508) 748-2876	Interview
11 Point Road Marion, MA 02738	Mr. Lennie Blodgett	(508) 748-1250	Interview
6 Point Road Marion, MA 02738	Mr. Jesse Cunningham	(508) 748-2286	Interview
11 Point Road Marion, MA 02738	Mr. John Spring	(617) 482-8434	Referral

**REFERENCE SOURCES (continued)**

Organization	Name	Telephone	Nature of Support
<b>NON-GOVERNMENT SOURCES (continued)</b>			
<b>LOCAL INDIVIDUALS (continued)</b>			
319 Wareham Road Marion, MA 02738	Mr. Warren Washburn	(508) 748-0791	No information
85 Converse Road Marion, MA 02738	Mr. Max Schlagel	(508) 748-2848	Referral
14 Bayview Road Marion, MA 02738	Mr. Walter Stevens	(508) 748-0914	No information

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APPENDIX B

REFERENCES AND ABSTRACTS



## APPENDIX B

### REFERENCES AND ABSTRACTS

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- B-2. War Department, "Artillery Ammunition", TM 9-1901, 29 June 1944 (D-3 & D-4).
- B-3. War Department, "Ammunition Inspection Guide", TM 9-1904, 2 March 1944.
- B-4. War Department, "Targets, Target Material, and Training Course Layouts", TM 9-855, 17 August 1944 (D-1).
- B-5. U.S. Army Center of Military History, Guarding the United States and Its Outposts, Washington, D.C., 1989.
- B-6. Hoyt, Edwin, U-Boats Offshore - When Hitler Struck America, Scarborough House, Chelsea, MI, 1978.
- B-7. Schroeder, Walter, Defenses of Narragansett Bay in World War II, Rhode Island Publications Society, 1980 (F-4).
- B-8. Lewis, Emanuel, Seacoast Fortifications of the United States, Pictorial Histories Publishing Company, Missoula, MT, 1979.
- B-9. Schreier, Konrad, Standard Guide to U.S. World War II Tanks and Artillery, Krause Publications, Iola, WI, 1994.
- B-10. Stanton, Shelby, World War II Order of Battle, Galahad Books, New York City, 1991.
- B-11. Seacoast Artillery - Basic Tactics and Technique, Military Service Publishing Company, Harrisburg, PA 1944 (D-5).
- B-12. Berhow, Mark, Modern American Harbor Defenses, Fort MacArthur Military Press, San Pedro, CA, 1992.
- B-13. Parkman, Aubrey, Army Engineers in New England: The Military and Civil Works of the Corps of Engineers in New England 1775-1975, U.S. Army Corps of Engineers, Waltham, MA, 1978.
- B-14. Tripp, H. Edmund, Reflections on a Town, Sippican Historical Society, 1991 (History of Marion).

- B-15. U.S. Department of Agriculture, Soil Survey of Plymouth County Massachusetts, Washington, DC, July 1969.
- B-16. National Oceanic and Atmospheric Administration, Tidal Current Tables 1994 - Atlantic Coast of North America, Washington, DC, 1993 (E-3).
- B-17. National Oceanic and Atmospheric Administration, Tide Tables 1994, East Coast of North and South America, Washington, DC, 1993 (E-2).
- B-18. Kirchner, D.P., "American Harbor Defense Forts", U.S. Naval Institute Proceedings, August 1958, pp. 93-101.
- B-19. Kirchner, D.P. and Lewis, E.R., "American Harbor Defenses: The Final Era", U.S. Naval Institute Proceedings, January 1968, pp. 85-98.
- B-20. Holder, Alex, "Trip Report: Terminal Island AMTB Battery", Coast Defense Study Group Journal, May 1994, pp. 19.
- B-21. Holder, Alex, "New England's 90mm AMTB Batteries", Coast Defense Study Group Journal, February 1986, pp. 4.
- B-22. Paliwoda, Gary, "Louisiana and Texas Panama Mounts", Coast Defense Study Group Journal, February 1994, pp. 43-46.
- B-23. Zink, Robert, "Coast Defenses of New Bedford and the Buzzards Bay Canal", Coast Defense Study Group Journal, November, 1989, pp. 22-25.
- B-24. Letter, CG Harbor Defenses of Portland, ME, 8 December 1942, subject: Housing Requirements for 90mm Gun Batteries, portions extracted in Coast Defense Study Group Journal, November, 1988, pp. 13.
- B-25. National Oceanic and Atmospheric Administration, "Monthly Station Normals of Temperature, Precipitation, and Heating and Cooling Degree Days, 1961-1990, Massachusetts", National Climatic Data Center, Asheville, NC, 1992.
- B-26. DERP-FUDS INPR (Site D01MA050601), New England Division, 30 June 1993 (E-1).
- B-27. US Army Corps of Engineers, Rock Island District, Site Safety Plan, 6 Dec 93.
- B-28. Realty Control File Summary, Engr Form 1603, Butler Point, MA, circa 1948, provided by Dr. Martin Gordon, CEHO (G-1).

B-29. Memo, subject: General Characteristics of the 90mm Anti-Motor Torpedo Boat Battery, circa 1943, provided by Dr. Martin Gordon, CEHO (F-3).

B-30. Annex to New Bedford harbor defense projects, including maps and fields of fire, obtained at National Archives, RG 407, Box 9, Special Projects - Harbor Defense 1929-1948 (F-2, L-1, and L-2).

B-31. Memo, War Department, Washington, DC, subject: Defense of Harbors Against Motor Torpedo Boats, 24 October 1942, obtained at National Archives, RG 407, Box 9, Special Projects - Harbor Defense 1929-1948 (F-1).

B-32. Memo, War Department, Washington, DC, subject: Plans for Firing Platform, 90mm Guns for Defense Against Motor Torpedo Boats, 3 November 1942, obtained at National Archives, RG 407, Box 9, Special Projects - Harbor Defense 1929-1948.

B-33. US Environmental Protection Agency, Buzzards Bay Comprehensive Conservation and Management Plan, Washington, DC, August 1991.

B-34. Memo, Massachusetts Division of Fisheries and Wildlife, subject: Threatened and Endangered Species, 8 July 1994.

B-35. Robinson, John, "Geraldo's Showboating Makes Waves in Buzzards Bay", Boston Globe, August 2, 1994.

B-36. "Fort Rodman's 8" Guns Fire Well After 20 Years", New Bedford Standard Times, August 29, 1941.

B-37. "Civilian Pastors Take the Place of Regular Army Chaplains in Serving Men at Fort Rodman and Outposts", New Bedford Standard Times, August 20, 1944.

B-38. "Valuable Contribution to Victory Revealed as Fort Rodman Returns to Peacetime Activities", New Bedford Standard Times, April 21, 1946.

B-39. McGovern, Terry, photos appearing in Coast Defense Study Journal, February, 1994, pp.1 (K-1).

B-40. Master plan map, Harbor Defenses of Narragansett Bay, Butler Point AMTB #934, 10 July 1946, revised 31 March 1947 (L-2).

B-41. Current real estate map, provided by Catherine Gibbs, Marion Town Clerk, 4 August 1994 (G-3).

- B-42. US Geological Survey topographical map, Onset, Mass, 1967.
- B-43. US Geological Survey topographical map, Marion, Mass, 1977.
- B-44. US Geological Survey topographical map, Sconticut Neck, Mass, 1975.
- B-45. US Geological Survey topographical map, Woods Hole, Mass, 1967.
- B-46. National Oceanic and Atmospheric Administration chart, Cape Cod Canal and Approaches, #13236, September 14, 1991.
- B-47. National Oceanic and Atmospheric Administration chart, Buzzards Bay, #13230, March 27, 1993.
- B-48. US Geological Survey Chart, Preliminary Geologic Map of Buzzards Bay, Massachusetts, 1977.

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APPENDIX C

GLOSSARY

## APPENDIX C

### Glossary

AA	Anti-Aircraft
AAA	Anti-Aircraft Artillery
AMTB	Anti-Motor Torpedo Boat
AR	Army Regulation
BD/DR	Building Demolition/Debris Removal
CEHND	U.S. Army Engineer, Huntsville Division
CENCD	U.S. Army Engineer, North Central Division
CENCR	U.S. Army Engineer, Rock Island District
CENED	U.S. Army Engineer, New England Division
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
DA	Department of Army
DERP	Defense Environmental Restoration Program
DOD	Department of Defense
ECM	Earth Covered Magazines
EOD	Explosive Ordnance Disposal
EPA	Environmental Protection Agency
FDE	Findings and Determination of Eligibility
FS	Feasibility Study
FUDS	Formerly Used Defense Site(s)
GSA	General Services Administration
HDCEP	Harbor Defense Command Post
HE	High Explosive
HTRW	Hazardous, Toxic and Radiological Waste
HTW	Hazardous and Toxic Waste
INPR	Inventory Project Report
IRP	Installation Restoration Program
M	Model Number
MM or mm	Millimeter
MT	Mechanical Time
OEW	Ordnance and Explosive Waste
PA	Preliminary Assessment
PD	Point Detonating
PRP	Potentially Responsible Party
RA	Remedial Action
RAC	Risk Assessment Code
RD	Remedial Design
RD/RA	Remedial Design/Remedial Action
RFC	Reconstruction Finance Corporation
RI	Remedial Investigation
RI/FS	Remedial Investigation/Feasibility Study
SARA	Superfund Amendments and Reauthorization Act
SI	Site Investigation or Site Inspection
TM	Technical Manual
USA	U.S. Army

USACE U.S. Army Corps of Engineers  
USADACS U.S. Army Defense Ammunition Center and School  
USAEDH U.S. Army Engineer Division, Huntsville  
USATCES U.S. Army Technical Center for Explosives Safety  
USN U.S. Navy  
UXO Unexploded Ordnance  
WAA War Assets Administration

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APPENDIX D

TEXTS/MANUALS

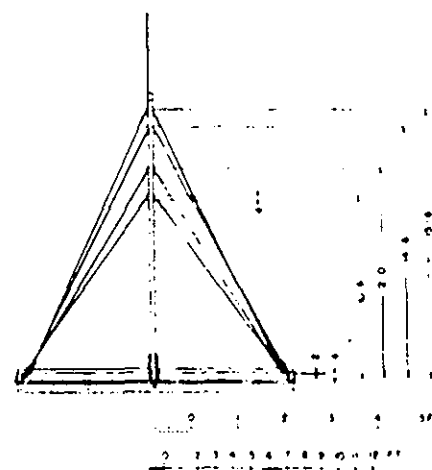


APPENDIX D  
TEXTS / MANUALS

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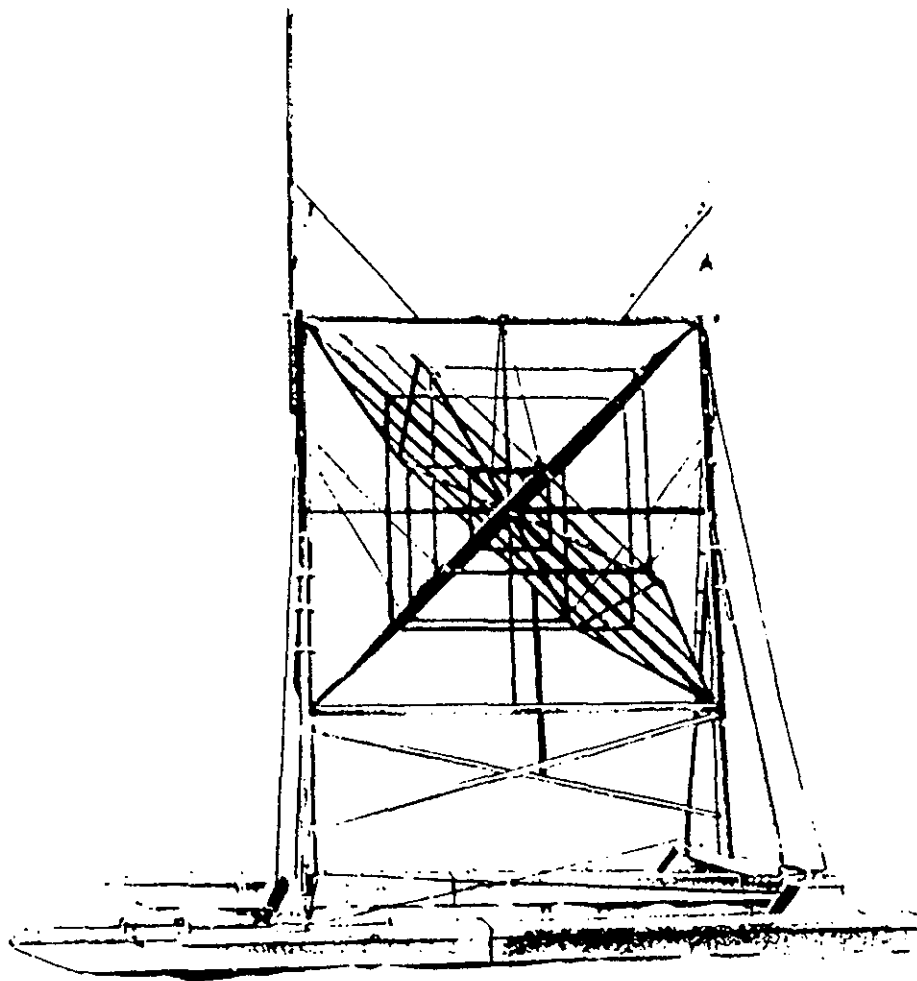
- D-1. Typical seacoast targets (B-4).
- D-2. 90mm rounds (B-1).
- D-3. 155mm projectiles (B-2).
- D-4. 37mm subcaliber rounds (B-2).
- D-5. Typical ammo magazine (B-11).

## RA PD 21983



**Figure 141 – Seacoast Target M7**

TARGETS AND EQUIPMENT FOR MOVING ARTILLERY TARGET RANGES



RA PD 21982

Figure 143 — Seacoast Target M9 — Side View

TARGETS AND EQUIPMENT FOR MOVING ARTILLERY TARGET RANGES

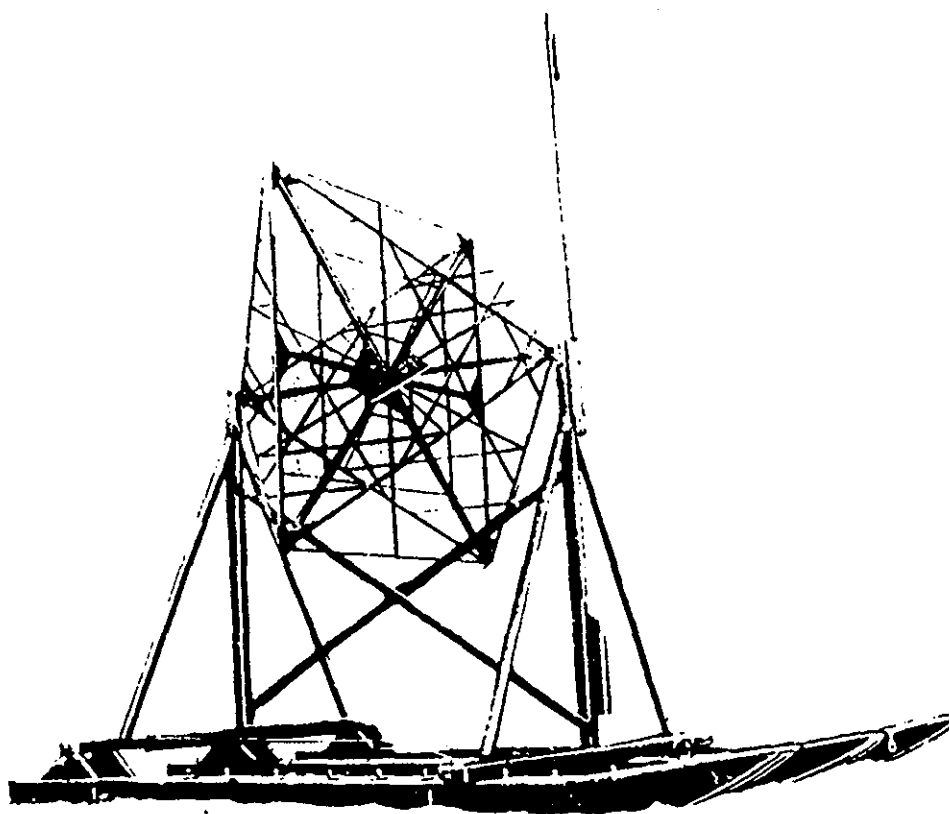


Figure 144 — Seacoast Target M10 — Right Front View

ORDNANCE SCHOOL

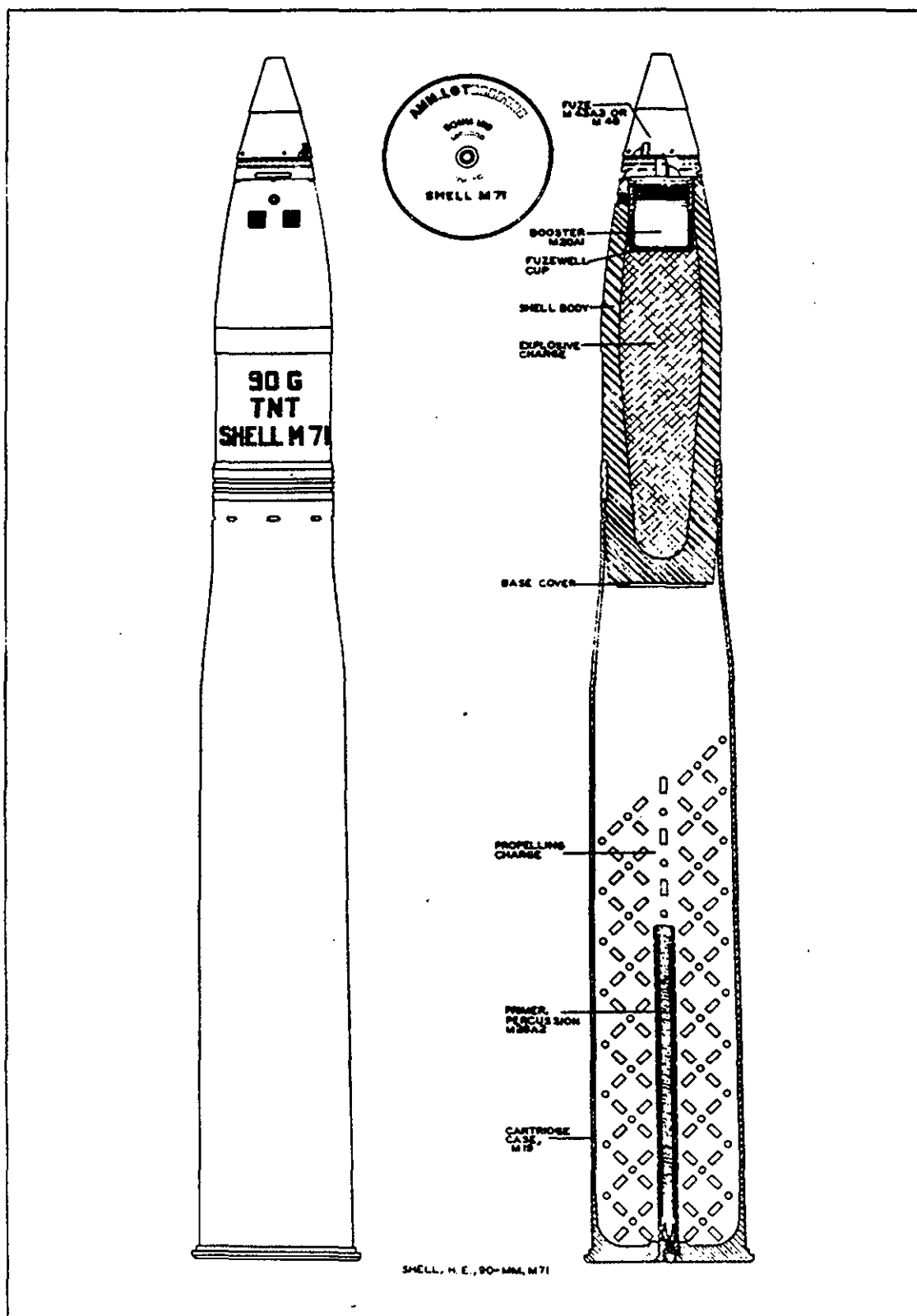


FIGURE 93. - SHELL, H.E., 90-MM, M71

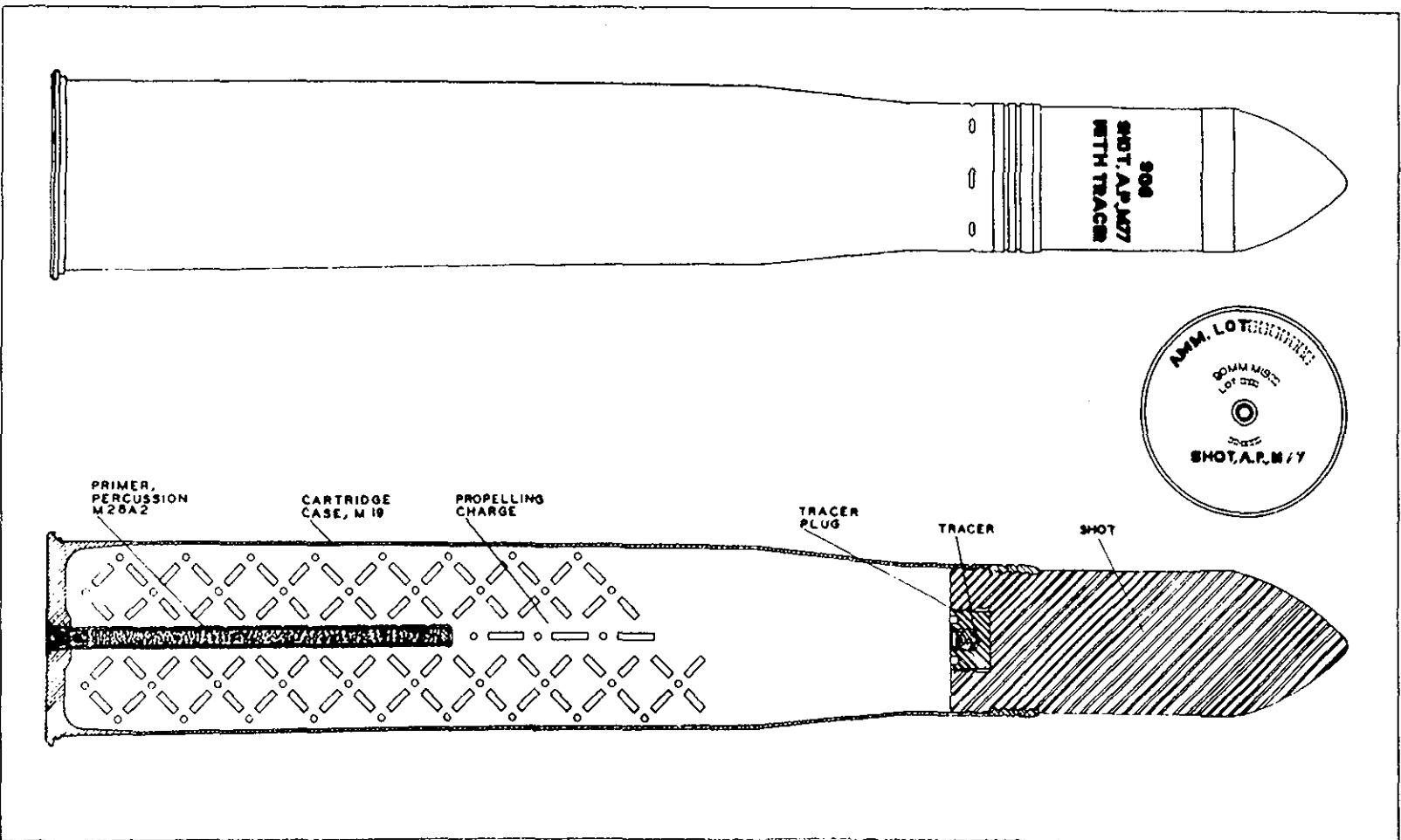


FIGURE 95. - SHOT, A.P., 90-MM, M77.

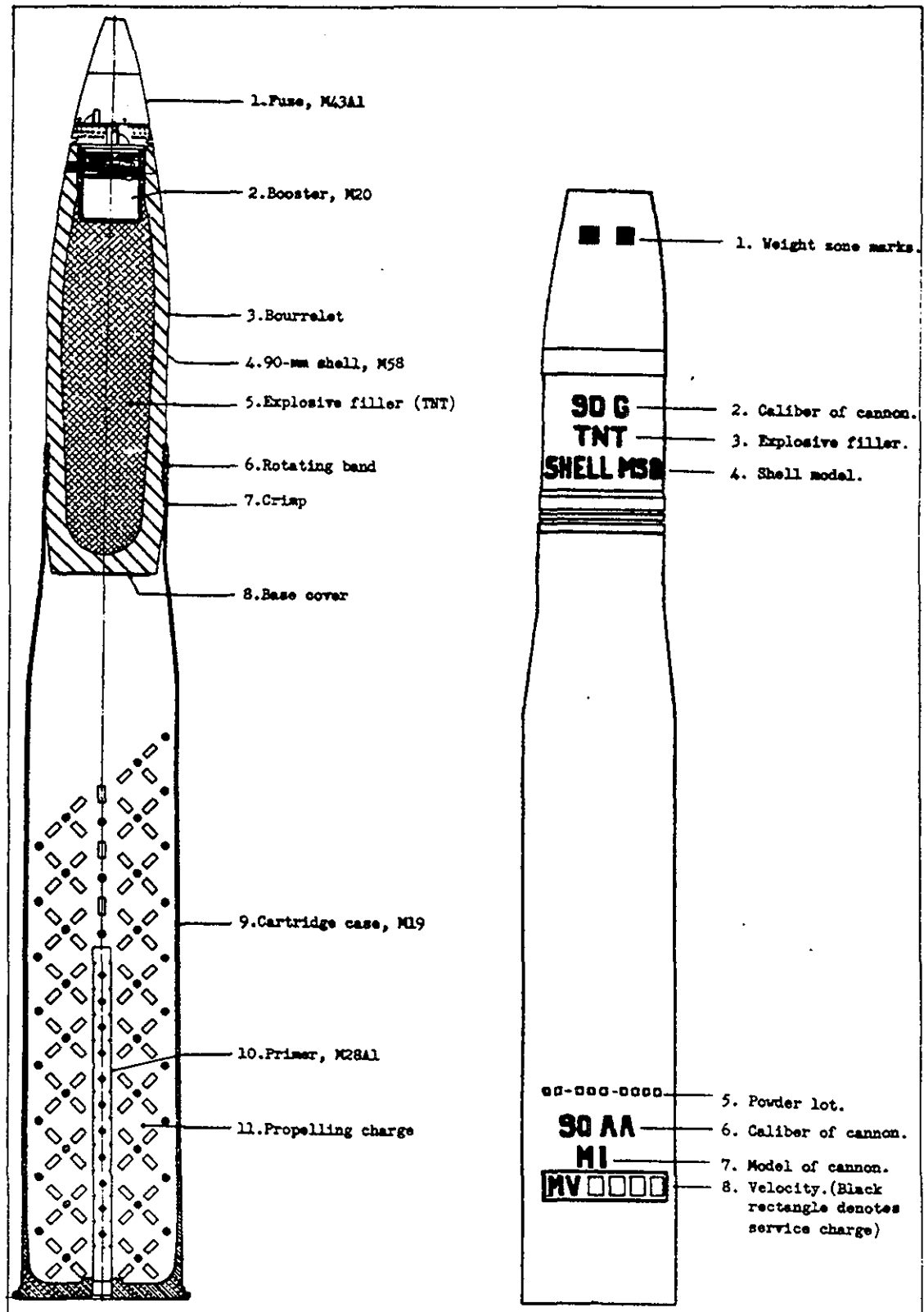


FIGURE 94. - SHELL, H.E., 90-MM, M58

FIXED AND SEMIFIXED ROUNDS AND SEPARATE-LOADING PROJECTILES



RA PD 80812

Figure 135 — SHELL, H.E., M101, Unfuzed, 155-mm Guns, M1917-17A1-18MI, M1, and M1A1 (Early Type Grommet Fastening Shown)

DATA

Length of projectile*.....	26.88 in.	Maximum charge, M1917-17A1-18 Guns ....	2,410 ft per sec
Width of rotating band.....	2.00 in.	Maximum range:	
Type of base .....	Boat-tailed	M1A1 Gun (at 46 deg	
Degree of taper.....	8.5 deg	49 min) .....	25,715 yd
Radius of ogive.....	10.75 cal.	M1917-17A1-18 Guns (at 35	
Muzzle velocity:		deg 24 min).....	20,100 yd
Maximum charge, M1 and			
M1A1 Guns .....	2,800 ft per sec		

\*—With eyebolt-lifting plug.



RA PD 80813

Figure 136 — SHELL, H.E., Mk. IIIA1, Unfuzed, 155-mm Guns, M1917-17A1-18MI

265. SHELL, H.E., MK. IIIA1, UNFUZED, 155-MM GUNS, M1917-17A1-18MI (fig. 136), being of earlier design than projectiles for 155-mm Guns M1 and M1A1, is distinguished by two narrow rotating bands. It is a modification of the earlier Mk. III Projectile, the nose being adapted to the new type fuzes. This modification of ogive and use of a standard contour fuze improve the ballistic characteristics.

DATA

Length of projectile*.....	26.88 in.	Muzzle velocity, super-	
Width of rotating bands		charge .....	2,410*; 2,800 ft per sec††
(two each) .....	0.59 in.	Maximum range, supercharge:	
Type of base.....	8 deg —boat-tailed	(35 deg 22 min).....	19,100 yd†
Radius of ogive .....	10.75 cal.	(35 deg) .....	22,450 yd††

\*—With eyebolt-lifting plug. †—In M1917-17A1-18MI Guns. ††—In M1 and M1A1 Guns.



FIXED AND SEMIFIXED ROUNDS AND SEPARATE-LOADING PROJECTILES



RA PD 80888

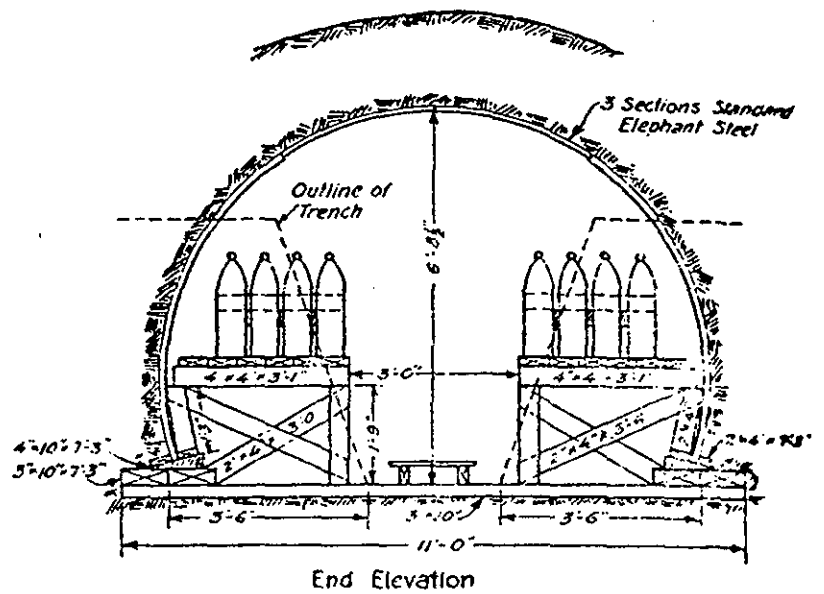
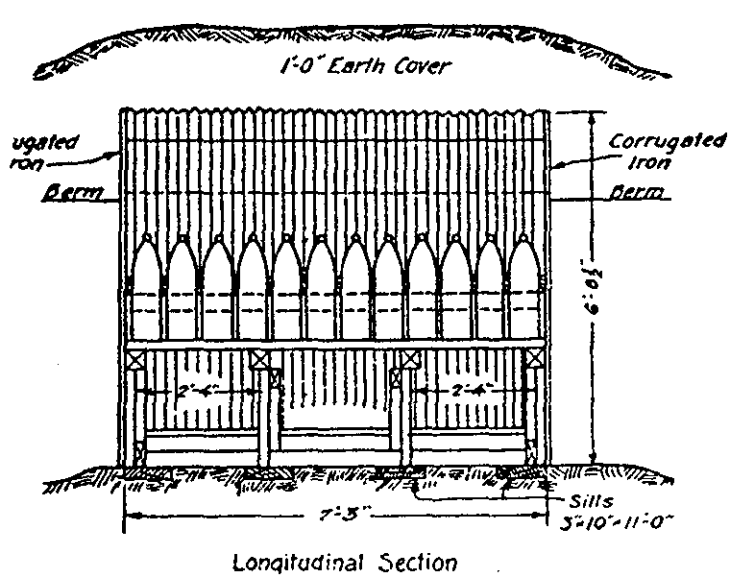
Figure 151 — SHELL, Fixed, Practice, M92, w/FUZE, P.D., M74,  
37-mm Subcaliber Guns, M12, M13, M14, and M1916

FIXED AND SEMIFIXED ROUNDS AND SEPARATE-LOADING PROJECTILES



RA PD 80700

Figure 150 — SHELL, Fixed, Practice, Mk. IIA1, w/FUZE, Base, Practice,  
M38. 37-mm Subcaliber Gun, M1916



**Plate 22. Elephant Steel Shelter for 155-mm Ammunition.**

ORDNANCE AND EXPLOSIVE WASTE  
ARCHIVES SEARCH REPORT  
FOR  
FORMER BUTLER POINT AMTB BATTERY  
MARION, MASSACHUSETTS  
PROJECT NUMBER D01MA050601

APPENDIX E

REPORTS/STUDIES

APPENDIX E  
REPORTS / STUDIES

Table of Contents

- E-1. INPR (ref B-26).
- E-2. 1994 tide predictions for Marion Harbor (B-17).
- E-3. 1994 current predictions for Buzzards Bay (B-16).

DEFENSE ENVIRONMENTAL RESTORATION PROGRAM  
FOR  
FORMERLY USED DEFENSE SITES  
FINDINGS AND DETERMINATION OF ELIGIBILITY  
DERP-FUDS SITE NO. D01MA0506  
PROPERTY OF KITTANSETT CLUB  
(BUTLER'S POINT AMTB BATTERY)  
MARION, MASSACHUSETTS

FINDINGS OF FACT

1. The site consisted of 4.1 acres leased. CENED believes that the lease began around 1943.
2. The site was known as Butler's Point Anti-Motor Torpedo Boat (AMTB) Battery. It was utilized by the Army in the defense of New Bedford Harbor. The Army built temporary barracks, a mess hall, and a Battalion Commander's (BC) Station. The Army also installed two 90mm M1 guns on fixed mounts, two 90mm guns on temporary mounts, two 155mm guns on concrete mounts, and magazines. CENED believes that the site was not under other than DOD control during the period of DOD use.
3. CENED believes that the lease was terminated sometime in 1947. The language of lease or the termination document is not known.

DETERMINATION

Based on the foregoing findings of fact, the site has been determined to be formerly used by DOD. It is therefore eligible for the Defense Environmental Restoration Program - Formerly Used Defense Sites established under 10 USC 2701 et seq.

30 JAN 93

Date



BRINK P. MILLER  
Colonel, Corps of Engineers  
Commanding

**PROJECT SUMMARY SHEET**  
**FOR**  
**DERP-FUDS OEW PROJECT NO. D01MA050601**  
**PROPERTY OF KITTANSETT CLUB**  
**(BUTLER'S POINT AMTB BATTERY)**  
**MARION, MASSACHUSETTS**  
**SITE NO. D01MA0506**  
**18 June 1993**

**DESCRIPTION OF OEW HAZARD:** The site was used by DOD during World War II as an anti-motor torpedo boat battery site from 1943 to 1946. Magazines, two 90mm M1 guns on fixed mounts, two 90mm guns on temporary mounts, and two 155mm guns on concrete mounts were on the site. Therefore, there is the possibility that ordnance or explosive waste remains on the site.

**PROJECT ELIGIBILITY:** During DOD control of the site, the site was used for anti-artillery purposes.

**POLICY CONSIDERATION:** The current owner has not brought ammunition to the site. DOD likely would be responsible for any ammunition or ordnance found at the site.

**PROPOSED PROJECT:** This INPR should be referred to CEHND-PM-OT for a determination of further action.

**RAC:** Attached.

**DIVISION POC:** Karen Schofield, CENED-RE-AM, (617) 647-8590.

**Tide Tables 1994** HIGH AND LOW WATER PREDICTIONS



# **East Coast of North and South America**

**Including Greenland**



**U.S. DEPARTMENT OF COMMERCE**  
**National Oceanic and Atmospheric Administration**  
**National Ocean Service**



## TABLE 1.—DAILY TIDE PREDICTIONS

### EXPLANATION OF TABLE

This table contains the predicted times and heights of the high and low waters for each day of the year at a number of places which are designated as *reference stations*. By using tidal differences from table 2, one can calculate the approximate times and heights of the tide at many other places which are called *subordinate stations*. Instructions on the use of the tidal differences are found in the explanation of table 2.

High water is the maximum height reached by each rising tide, and low water is the minimum height reached by each falling tide. High and low waters can be selected from the predictions by the comparison of consecutive heights. Because of diurnal inequality at certain places, however, there may be a difference of only a few tenths of a foot between one high water and low water of a day, but a marked difference in height between the other high water and low water. Therefore, in using the tide tables it is essential to note carefully the heights as well as the times of the tides.

**Time.**—The kind of time used for the predictions at each reference station is indicated by the time meridian at the bottom of each page. Daylight saving time is not used in this publication. If daylight saving time is required, add one (1) hour to the predicted time.

**Datum.**—The datum from which the predicted heights are recorded is the same as that used for the nautical charts of the locality. The datum for the Pacific coast of the United States (including Hawaii and Alaska) is the mean of the lower of the two low waters of each day. For foreign coasts a datum approximating to mean low water springs, Indian spring low water, or the lowest possible low water is generally used. The depression of the datum below mean sea level (MSL) for each of the reference stations of this volume is given on the preceding page.

**Depth of water.**—The nautical charts published by the United States and other maritime nations show the depth of the water as referred to a low water datum corresponding to that from which the predicted tidal heights are recorded. To find the actual depth of water at any time the height of the tide should be added to the charted depth. If the height of the tide is negative—that is, if there is a minus sign (—) before the tabular height—the height should be subtracted from the charted depth. For any time between high and low water, the height of the tide may be estimated from the heights of the preceding and the following tides, or table 3 may be used. The reference stations in table 1 contain the heights in centimeters as well as in feet.

**Variation in sea level.**—Changes in winds and barometric conditions cause variations in sea level from day to day. In general, with onshore winds or a low barometer the heights of both the high and low waters will be higher than predicted, while with offshore winds or a high barometer they will be lower. There are also seasonal variations in sea level, but these variations have been included in the predictions for each station. At ocean stations the seasonal variation in sea level is usually less than half a foot.

At stations on tidal rivers the average seasonal variation in river level due to freshets and droughts may be considerably more than a foot. The predictions for these stations include an allowance for this seasonal variation representing average freshet and drought conditions. Unusual freshets or droughts, however, will cause the tides to be higher or lower, respectively, than predicted.

**Number of tides.**—There are usually two high and two low waters in a day. Tides follow the Moon more closely than they do the Sun, and the lunar or tidal day is about 50 minutes longer than the solar day. This causes the tide to occur later each day, and a tide that has occurred near the end of one calendar day will be followed by a corresponding tide that may skip the next day and occur in the early morning of the third day. Thus on certain days of each month only a single high or a single low water occurs. At some stations, during portions of each month, the tide becomes diurnal—that is, only one high and one low water will occur during the period of a lunar day.

TABLE 1.—DAILY TIDE PREDICTIONS

**Relation of tide to current.**—In using these tables of tide predictions bear in mind that they give the times and heights of high and low waters and not the times of turning of the current or slack water. For stations on the outer coast there is usually a small difference between the time of high or low water and the beginning of ebb or flood current, but for places in narrow channels, landlocked harbors, or on tidal rivers, the time of slack water may differ by several hours from the time of high or low water stand. The relation of the times of high and low water to the turning of the current depends upon a number of factors, so no simple or general rule can be given. For the predicted time of slack water, and other current data, reference should be made to the Tidal Current Tables published by the National Ocean Service in two separate volumes, one for the Atlantic coast of North America and the other for the Pacific coast of North America and Asia.

**Typical tide curves.**—The variations in the tide from day to day and from place to place are illustrated on the opposite page by the tide curves for representative ports along the Pacific coast of the United States. It will be noted that one of the chief characteristics of the tide in this region is diurnal inequality, i.e., the difference in heights of successive high waters or low waters. The largest inequality is in the low waters although at Seattle there is also considerable difference between the two high waters on certain days. The importance of this inequality at Seattle is brought out by the curve which shows that, at times, the two high waters of a day differ by over 4 feet and the two low waters differ by more than 8 feet. At Ketchikan and Anchorage the inequality is less pronounced because of the large range of tide. In these localities the principal variations in the tide follow the changes in the Moon's phase and distance. The tide at Anchorage is one of the largest in the world. At Unalaska and Dutch Harbor the tide is such that it is semidiurnal around the times the Moon is on the Equator but becomes diurnal around the times of maximum north or south declination of the Moon.

# Newport, R.I., 1994

## Times and Heights of High and Low Waters

January				February				March			
Time	Height	Time	Height	Time	Height	Time	Height	Time	Height	Time	Height
1 Sa 0302 -0.4 -12 0957 4.0 122 1534 -0.5 -15 2225 3.7 113		16 Su 0348 0.0 0 1035 3.4 104 1605 0.0 0 2301 3.4 104		1 Tu 0433 -0.4 -12 1119 3.6 110 1850 -0.5 -15 2351 3.9 119		16 W 0424 0.3 9 1126 2.9 88 1833 0.2 6 2354 3.1 94		1 Tu 0329 -0.8 -24 1007 3.9 119 1541 -0.8 -24 2233 4.3 131		16 W 0318 0.0 0 1011 3.1 94 1522 0.0 0 2231 3.4 104	
2 Su 0352 -0.3 -9 1047 3.8 116 1620 -0.4 -12 2317 3.7 113		17 M 0424 0.3 9 1119 3.1 94 1838 0.2 6 2348 3.2 98		2 W 0531 -0.2 -6 1217 3.3 101 1744 -0.3 -9		17 Th 0505 0.4 12 1215 2.8 79 1715 0.3 9		2 W 0421 -0.8 -18 1100 3.7 113 1631 -0.5 -15 2329 4.1 125		17 Th 0353 0.2 6 1053 2.9 88 1558 0.2 6 2315 3.2 98	
3 M 0445 -0.2 -6 1140 3.6 110 1710 -0.3 -9		18 Tu 0503 0.5 15 1206 2.9 88 1716 0.3 9		3 Th 0051 3.8 116 0637 0.0 0 1319 3.2 98 1847 -0.1 -3		18 F 0046 2.9 88 0553 0.8 18 1311 2.5 76 1804 0.4 12		3 Th 0517 -0.3 -9 1158 3.4 104 1726 -0.2 -6		18 F 0432 0.3 9 1140 2.7 82 1640 0.3 9	
4 Tu 0014 3.7 113 0545 0.0 0 1238 3.4 104 1806 -0.2 -6		19 W 0039 3.0 91 0548 0.6 18 1258 2.7 82 1800 0.4 12		4 F 0155 3.7 113 0757 0.2 6 1424 3.1 94 2000 0.0 0		19 Sa 0144 2.9 88 0851 0.7 21 1411 2.5 76 1904 0.5 15		4 F 0030 3.9 119 0623 0.0 0 1301 3.2 98 1831 0.0 0		19 Sa 0005 3.0 91 0518 0.4 12 1234 2.8 79 1729 0.4 12	
5 W 0114 3.7 113 0653 0.1 3 1340 3.2 98 1908 -0.1 -3		20 Th 0133 3.0 91 0642 0.8 24 1354 2.8 79 1852 0.5 15		5 Sa 0300 3.8 116 0926 0.2 6 1528 3.1 94 2122 0.0 0		20 Su 0244 3.0 91 0800 0.7 21 1511 2.6 79 2012 0.4 12		5 Sa 0135 3.7 113 0748 0.3 9 1406 3.1 94 1952 0.2 6		20 Su 0102 2.9 88 0613 0.5 15 1335 2.8 79 1828 0.5 15	
6 Th 0217 3.8 116 0810 0.1 3 1444 3.2 98 2017 -0.1 -3		21 F 0229 3.0 91 0748 0.8 24 1451 2.8 79 1952 0.5 15		6 Su 0401 3.8 116 1039 0.1 3 1627 3.3 101 2235 -0.1 -3		21 M 0341 3.2 98 0913 0.5 15 1607 2.8 85 2123 0.3 9		6 Su 0240 3.6 110 0918 0.3 9 1510 3.1 94 2125 0.2 6		21 M 0204 3.0 91 0718 0.5 15 1437 2.7 82 1938 0.4 12	
7 F 0319 4.0 122 0931 0.1 3 1545 3.3 101 2128 -0.2 -6		22 Sa 0324 3.1 94 0858 0.7 21 1547 2.7 82 2056 0.4 12		7 M 0458 3.9 119 1135 -0.1 -3 1721 3.5 107 2334 -0.3 -9		22 Tu 0434 3.4 104 1017 0.2 6 1659 3.2 98 2227 0.0 0		7 M 0342 3.6 110 1028 0.2 6 1609 3.3 101 2239 0.1 3		22 Tu 0304 3.1 94 0828 0.4 12 1535 3.0 91 2053 0.3 9	
8 Sa 0418 4.1 125 1041 -0.1 -3 1643 3.4 104 2234 -0.3 -9		23 Su 0417 3.3 101 1004 0.5 15 1640 2.8 85 2157 0.2 6		8 Tu 0549 4.0 122 1220 -0.2 -6 1811 3.6 110		23 W 0524 3.7 113 1110 -0.1 -3 1747 3.6 110 2324 -0.4 -12		8 Tu 0439 3.6 110 1120 0.1 3 1702 3.5 107 2332 -0.1 -3		23 W 0401 3.4 104 0935 0.1 3 1628 3.4 104 2202 0.0 0	
9 Su 0513 4.3 131 1140 -0.3 -9 1737 3.6 110 2333 -0.4 -12		24 M 0506 3.6 110 1058 0.2 6 1728 3.1 94 2253 0.0 0		9 W 0022 -0.4 -12 0636 4.1 125 1257 -0.3 -9 1856 3.8 116		24 Th 0811 4.0 122 1157 -0.4 -12 1833 3.9 119		9 W 0529 3.7 113 1200 0.0 0 1749 3.7 113		24 Th 0454 3.7 113 1033 -0.2 -6 1718 3.6 116 2302 -0.4 -12	
10 M 0605 4.4 134 1229 -0.4 -12 1828 3.7 113		25 Tu 0552 3.8 116 1144 -0.1 -3 1815 3.4 104 2344 -0.3 -9		10 Th 0104 -0.5 -15 0720 4.1 125 1330 -0.3 -9 1939 3.9 119		25 F 0015 -0.7 -21 0857 4.2 128 1242 -0.7 -21 1919 4.2 128		10 Th 0015 -0.2 -6 0814 3.8 116 1232 -0.1 -3 1833 3.8 116		25 F 0543 3.9 119 1125 -0.5 -15 1806 4.3 131 2357 -0.7 -21	
11 Tu 0025 -0.5 -15 0654 4.4 134 1313 -0.4 -12 1916 3.8 116		26 W 0637 4.0 122 1227 -0.3 -9 1859 3.6 110		11 F 0140 -0.4 -12 0802 4.0 122 1400 -0.3 -9 2021 3.9 119		26 Sa 0104 -0.9 -27 0743 4.3 131 1328 -0.9 -27 2005 4.4 137		11 F 0050 -0.3 -9 0858 3.8 116 1300 -0.2 -6 1914 3.9 119		26 Sa 0632 4.2 128 1213 -0.8 -24 1854 4.6 140	
12 W 0112 -0.6 -18 0741 4.4 134 1353 -0.4 -12 2002 3.9 119		27 Th 0032 -0.5 -15 0721 4.2 128 1308 -0.5 -15 1944 3.8 116		12 Sa 0213 -0.4 -12 0842 3.8 116 1428 -0.3 -9 2102 3.8 116		27 Su 0152 -1.0 -30 0829 4.3 131 1410 -1.0 -30 2052 4.5 137		12 Sa 0121 -0.3 -9 0738 3.8 116 1328 -0.2 -6 1953 4.0 122		27 Su 0048 -1.0 -30 0720 4.3 131 1301 -1.0 -30 1942 4.8 146	
13 Th 0155 -0.5 -15 0825 4.2 128 1428 -0.4 -12 2047 3.8 116		28 F 0118 -0.7 -21 0806 4.3 131 1350 -0.7 -21 2028 4.0 122		13 Su 0245 -0.2 -6 0922 3.8 110 1455 -0.2 -6 2142 3.7 113		28 M 0240 -1.0 -30 0917 4.2 128 1455 -0.9 -27 2141 4.5 137		13 Su 0149 -0.3 -9 0814 3.7 113 1352 -0.2 -6 2032 3.9 119		28 M 0137 -1.1 -34 0808 4.3 131 1347 -1.0 -30 2030 4.9 149	
14 F 0235 -0.4 -12 0909 4.0 122 1502 -0.3 -9 2131 3.7 113		29 Sa 0205 -0.8 -24 0851 4.2 128 1432 -0.8 -24 2115 4.1 125		14 M 0316 -0.1 -3 1001 3.4 104 1525 -0.1 -3 2224 3.5 107				14 M 0217 -0.2 -6 0852 3.5 107 1419 -0.2 -6 2111 3.8 116		29 Tu 0226 -1.0 -30 0857 4.2 128 1434 -0.9 -27 2121 4.8 146	
15 Sa 0312 -0.2 -6 0952 3.7 113 1533 -0.1 -3 2215 3.5 107		30 Su 0252 -0.8 -24 0937 4.1 125 1515 -0.8 -24 2203 4.1 125		15 Tu 0348 0.1 3 1042 3.1 94 1557 0.0 0 2307 3.3 101				15 Tu 0247 -0.1 -3 0931 3.3 101 1449 -0.1 -3 2150 3.6 110		30 W 0316 -0.9 -27 0948 4.0 122 1523 -0.7 -21 2213 4.5 137	
		31 M 0341 -0.6 -18 1027 3.9 119 1601 -0.6 -18 2255 4.0 122								31 Th 0408 -0.6 -18 1043 3.7 113 1614 -0.4 -12 2309 4.2 128	

Time meridian 75° W. 0000 is midnight. 1200 is noon.  
 Heights are referred to mean lower low water which is the chart datum of soundings.

# Newport, R.I., 1994

## Times and Heights of High and Low Waters

April				May				June			
Time	Height	Time	Height	Time	Height	Time	Height	Time	Height	Time	Height
1 F 0505 -0.3 -9 1140 3.4 104 1711 -0.1 -3		16 Sa 0408 0.2 8 1113 2.8 85 1613 0.3 9 2332 3.2 98		1 Su 0549 0.1 3 1221 3.4 104 1805 0.4 12		16 M 0433 0.2 8 1141 3.1 94 1846 0.4 12 2358 3.3 101		1 W 0111 3.3 101 0704 0.5 15 1346 3.5 107 2007 0.8 24		16 Th 0028 3.5 107 0553 0.1 3 1307 3.8 116 1832 0.4 12	
2 Sa 0009 3.9 119 0609 0.1 3 1242 3.3 101 1819 0.2 6		17 Su 0453 0.3 8 1206 2.8 85 1704 0.4 12		2 M 0046 3.8 110 0656 0.3 9 1321 3.4 104 1829 0.5 15		17 Tu 0522 0.2 8 1236 3.2 98 1744 0.4 12		2 Th 0206 3.1 94 0759 0.6 18 1440 3.5 107 2120 0.8 24		17 F 0128 3.4 104 0651 0.0 0 1405 4.0 122 1942 0.4 12	
3 Su 0112 3.6 110 0728 0.3 9 1346 3.2 98 1847 0.4 12		18 M 0027 3.1 94 0545 0.4 12 1304 2.8 85 1803 0.5 15		3 Tu 0147 3.3 101 0809 0.5 15 1420 3.4 104 2058 0.6 18		18 W 0055 3.3 101 0616 0.2 8 1334 3.4 104 1851 0.4 12		3 F 0300 3.0 91 0850 0.6 18 1531 3.8 110 2215 0.8 24		18 Sa 0229 3.4 104 0753 0.0 0 1504 4.2 128 2055 0.2 6	
4 M 0216 3.4 104 0854 0.4 12 1448 3.2 98 2122 0.4 12		19 Tu 0127 3.1 94 0645 0.4 12 1404 3.0 91 1912 0.4 12		4 W 0245 3.2 98 0914 0.5 15 1516 3.5 107 2205 0.5 15		19 Th 0156 3.3 101 0718 0.1 3 1432 3.7 113 2003 0.3 8		4 Sa 0351 3.1 94 0935 0.6 18 1618 3.7 113 2257 0.6 18		19 Su 0330 3.5 107 0858 -0.1 -3 1602 4.5 137 2206 0.0 0	
5 Tu 0317 3.4 104 1001 0.3 9 1546 3.4 104 2230 0.3 9		20 W 0228 3.2 98 0750 0.3 9 1502 3.3 101 2026 0.3 9		5 Th 0339 3.2 98 1003 0.5 15 1606 3.6 110 2255 0.4 12		20 F 0256 3.4 104 0822 0.0 0 1529 4.0 122 2114 0.1 3		5 Su 0439 3.1 94 1016 0.5 15 1704 3.9 119 2330 0.5 15		20 M 0426 3.7 113 1002 -0.2 -6 1658 4.7 143 2309 -0.2 -6	
6 W 0413 3.4 104 1050 0.2 8 1637 3.5 107 2320 0.1 3		21 Th 0327 3.4 104 0856 0.0 0 1557 3.7 113 2137 0.0 0		6 F 0429 3.2 98 1040 0.4 12 1652 3.8 116 2333 0.3 8		21 Sa 0354 3.8 110 0924 -0.2 -6 1624 4.4 134 2221 -0.2 -6		6 M 0625 3.2 98 1056 0.4 12 1747 4.0 122		21 Tu 0525 3.8 116 1103 -0.3 -9 1752 4.9 149	
7 Th 0502 3.4 104 1127 0.2 6 1723 3.7 113 2358 0.0 0		22 F 0423 3.8 110 0957 -0.2 -6 1650 4.2 128 2241 -0.3 -9		7 Sa 0514 3.3 101 1110 0.3 9 1735 3.9 118		22 Su 0450 3.8 116 1024 -0.4 -12 1717 4.7 143 2321 -0.4 -12		7 Tu 0000 0.4 12 0609 3.3 101 1134 0.3 9 1829 4.1 125		22 W 0006 -0.3 -9 0619 4.0 122 1201 -0.4 -12 1844 5.0 152	
8 F 0546 3.5 107 1157 0.1 3 1806 3.9 119		23 Sa 0516 3.9 119 1053 -0.5 -15 1740 4.6 140 2338 -0.7 -21		8 Su 0603 0.2 8 1057 3.4 104 1140 0.2 8 1816 4.0 122		23 M 0544 4.0 122 1121 -0.8 -18 1809 5.0 152		8 W 0032 0.3 8 0652 3.4 104 1213 0.2 8 1810 4.2 128		23 Th 0056 -0.5 -15 0711 4.1 125 1255 -0.5 -15 1834 5.0 152	
9 Sa 0030 -0.1 -3 0628 3.5 107 1223 0.0 0 1846 4.0 122		24 Su 0607 4.1 125 1145 -0.7 -21 1830 4.9 149		9 M 0030 0.1 3 0638 3.4 104 1210 0.1 3 1856 4.1 125		24 Tu 0017 -0.8 -18 0637 4.1 125 1215 -0.7 -21 1801 5.1 155		9 Th 0104 0.1 3 0735 3.4 104 1252 0.2 6 1851 4.2 128		24 F 0147 -0.5 -15 0802 4.2 128 1347 -0.4 -12 2024 4.9 146	
10 Su 0057 -0.1 -3 0707 3.6 110 1248 -0.1 -3 1825 4.0 122		25 M 0031 -0.9 -27 0657 4.2 128 1236 -0.9 -27 1820 5.0 152		10 Tu 0058 0.1 3 0719 3.4 104 1243 0.1 3 1836 4.1 125		25 W 0109 -0.7 -21 0728 4.2 128 1306 -0.7 -21 1852 5.1 155		10 F 0139 0.1 3 0817 3.5 107 1331 0.1 3 2032 4.1 125		25 Sa 0234 -0.4 -12 0852 4.2 128 1437 -0.2 -6 2113 4.6 140	
11 M 0124 -0.1 -3 0746 3.5 107 1316 -0.1 -3 2003 4.0 122		26 Tu 0122 -1.0 -30 0747 4.2 128 1326 -0.9 -27 2010 5.0 152		11 W 0127 0.0 0 0800 3.4 104 1317 0.1 3 2015 4.0 122		26 Th 0200 -0.7 -21 0820 4.2 128 1400 -0.8 -18 2043 4.9 149		11 Sa 0214 0.0 0 0859 3.5 107 1411 0.1 3 2114 4.0 122		26 Su 0318 -0.3 -9 0942 4.1 125 1526 0.0 0 2202 4.3 131	
12 Tu 0151 -0.1 -3 0825 3.4 104 1346 -0.1 -3 2042 3.9 119		27 W 0213 -0.9 -27 0836 4.2 128 1416 -0.8 -24 2101 4.9 149		12 Th 0159 0.0 0 0840 3.3 101 1352 0.1 3 2055 3.9 118		27 F 0250 -0.8 -18 0912 4.1 125 1452 -0.4 -12 2134 4.8 140		12 Su 0251 0.0 0 0943 3.5 107 1454 0.2 6 2157 3.9 119		27 M 0400 -0.1 -3 1031 4.0 122 1614 0.3 8 2250 3.9 119	
13 W 0221 -0.1 -3 0904 3.3 101 1418 0.0 0 2121 3.7 113		28 Th 0304 -0.8 -24 0930 4.0 122 1506 -0.6 -18 2154 4.6 140		13 F 0233 0.0 0 0922 3.2 98 1429 0.2 6 2136 3.8 116		28 Sa 0340 -0.4 -12 1005 3.9 119 1545 -0.1 -3 2227 4.3 131		13 M 0331 0.0 0 1028 3.5 107 1541 0.2 6 2243 3.7 113		28 Tu 0440 0.2 6 1122 3.8 116 1702 0.5 15 2340 3.8 110	
14 Th 0253 0.0 0 0944 3.1 94 1453 0.1 3 2201 3.8 110		29 F 0355 -0.5 -15 1025 3.8 116 1559 -0.3 -9 2249 4.3 131		14 Sa 0309 0.1 3 1005 3.1 84 1510 0.2 6 2219 3.8 110		29 Su 0429 -0.1 -3 1059 3.9 118 1640 0.2 6 2320 3.9 119		14 Tu 0414 0.0 0 1117 3.5 107 1632 0.3 8 2333 3.8 110		29 W 0519 0.4 12 1213 3.7 113 1753 0.8 24	
15 F 0328 0.1 3 1027 3.0 91 1530 0.2 6 2244 3.4 104		30 Sa 0450 -0.2 -6 1121 3.6 110 1657 0.1 3 2346 3.9 119		15 Su 0349 0.1 3 1051 3.1 84 1555 0.3 8 2305 3.5 107		30 M 0519 0.1 3 1154 3.8 110 1739 0.5 15		15 W 0501 0.0 0 1210 3.8 110 1728 0.4 12		30 Th 0031 3.3 101 0600 0.6 18 1306 3.8 110 1849 1.0 30	
						31 Tu 0015 3.8 110 0611 0.4 12 1250 3.5 107 1848 0.7 21					

Time meridian 75° W. 0000 is midnight. 1200 is noon.  
 Heights are referred to mean lower low water which is the chart datum of soundings.

## Newport, R.I., 1994

## Times and Heights of High and Low Waters

July				August				September			
Time	Height	Time	Height	Time	Height	Time	Height	Time	Height	Time	Height
1 F 0123 3.1 94 0644 0.7 21 1359 3.5 107 1954 1.1 34		16 Sa 0104 3.5 107 0627 0.1 3 1342 4.1 125 1925 0.4 12		1 M 0232 2.8 85 0731 0.8 24 1505 3.5 107 2050 1.1 34		16 Tu 0255 3.4 104 0832 0.3 9 1529 4.3 131 2157 0.4 12		1 Th 0350 3.1 94 0900 0.7 21 1615 3.7 113 2202 0.7 21		16 F 0436 3.8 116 1059 0.2 6 1702 4.1 125 2333 0.2 6	
2 Sa 0217 3.0 91 0733 0.7 21 1452 3.5 107 2105 1.0 30		17 Su 0207 3.4 104 0730 0.1 3 1444 4.3 131 2042 0.4 12		2 Tu 0329 2.9 88 0833 0.8 24 1558 3.8 110 2157 0.9 27		17 W 0357 3.6 110 0950 0.2 6 1627 4.4 134 2300 0.2 6		2 F 0441 3.4 104 1004 0.5 15 1703 4.0 122 2251 0.4 12		17 Sa 0526 4.0 122 1148 0.1 3 1750 4.2 128	
3 Su 0311 2.9 88 0827 0.7 21 1543 3.6 110 2204 0.9 27		18 M 0310 3.5 107 0839 0.1 3 1544 4.4 134 2158 0.3 9		3 W 0422 3.1 94 0935 0.7 21 1647 3.8 116 2248 0.7 21		18 Th 0454 3.8 116 1057 0.1 3 1721 4.5 137 2350 0.1 3		3 Sa 0528 3.7 113 1100 0.2 6 1749 4.2 128 2335 0.0 0		18 Su 0610 0.1 3 0812 4.2 128 1229 0.0 0 1833 4.2 128	
4 M 0404 3.0 91 0922 0.7 21 1631 3.8 116 2249 0.8 24		19 Tu 0411 3.6 110 0949 0.0 0 1642 4.6 140 2304 0.1 3		4 Th 0511 3.3 101 1032 0.5 15 1733 4.0 122 2330 0.4 12		19 F 0546 4.0 122 1152 0.0 0 1810 4.5 137		4 Su 0613 4.1 125 1150 -0.1 -3 1834 4.4 134		19 M 0642 0.0 0 0854 4.3 131 1304 0.0 0 1914 4.1 125	
5 Tu 0453 3.1 94 1013 0.6 18 1717 3.9 119 2327 0.6 18		20 W 0508 3.8 116 1055 -0.1 -3 1736 4.8 148 2359 -0.1 -3		5 F 0558 3.5 107 1123 0.3 9 1818 4.2 128		20 Sa 0632 -0.1 -3 0834 4.2 128 1240 -0.1 -3 1856 4.5 137		5 M 0618 -0.2 -6 0857 4.4 134 1238 -0.3 -9 1918 4.5 137		20 Tu 0110 0.0 0 0735 4.4 134 1335 0.0 0 1954 4.0 122	
6 W 0541 3.3 101 1102 0.4 12 1802 4.1 125		21 Th 0602 4.0 122 1154 -0.2 -6 1828 4.8 146		6 Sa 0610 0.2 6 0842 3.8 116 1210 0.1 3 1901 4.4 134		21 Su 0109 -0.1 -3 0719 4.3 131 1322 -0.1 -3 1940 4.4 134		6 Tu 0100 -0.5 -15 0742 4.6 140 1324 -0.5 -15 2003 4.5 137		21 W 0138 0.0 0 0815 4.3 131 1405 0.1 3 2033 3.9 119	
7 Th 0603 0.4 12 0626 3.4 104 1147 0.3 9 1844 4.2 128		22 F 0647 -0.2 -6 0653 4.2 128 1247 -0.3 -9 1817 4.8 146		7 Su 0648 -0.1 -3 0725 4.0 122 1256 -0.1 -3 1844 4.5 137		22 M 0143 -0.1 -3 0803 4.4 134 1359 0.0 0 2022 4.3 131		7 W 0142 -0.6 -18 0828 4.8 148 1411 -0.5 -15 2049 4.4 134		22 Th 0206 0.0 0 0855 4.2 128 1435 0.2 6 2113 3.7 113	
8 F 0639 0.2 6 0709 3.6 110 1230 0.2 6 1927 4.3 131		23 Sa 0131 -0.3 -9 0742 4.3 131 1336 -0.2 -6 2003 4.7 143		8 M 0127 -0.2 -6 0809 4.2 128 1341 -0.2 -6 2027 4.4 134		23 Tu 0214 -0.1 -3 0845 4.3 131 1434 0.1 3 2103 4.1 125		8 Th 0226 -0.6 -18 0915 4.8 148 1500 -0.4 -12 2138 4.2 128		23 F 0235 0.1 3 0936 4.0 122 1506 0.4 12 2153 3.4 104	
9 Sa 0116 0.0 0 0752 3.7 113 1313 0.1 3 2009 4.3 131		24 Su 0211 -0.2 -6 0829 4.3 131 1420 -0.1 -3 2049 4.5 137		9 Tu 0207 -0.3 -9 0853 4.3 131 1427 -0.2 -6 2112 4.3 131		24 W 0244 0.0 0 0927 4.2 128 1507 0.3 9 2144 3.8 116		9 F 0311 -0.5 -15 1006 4.7 143 1551 -0.2 -6 2230 4.0 122		24 Sa 0307 0.3 9 1018 3.8 116 1541 0.5 15 2237 3.2 98	
10 Su 0153 -0.1 -3 0835 3.8 116 1356 0.0 0 2051 4.3 131		25 M 0248 -0.1 -3 0915 4.2 128 1502 0.1 3 2133 4.2 128		10 W 0249 -0.4 -12 0939 4.4 134 1514 -0.2 -6 2159 4.2 128		25 Th 0313 0.2 6 1010 4.0 122 1540 0.5 15 2226 3.5 107		10 Sa 0359 -0.3 -9 1100 4.5 137 1646 0.0 0 2327 3.7 113		25 Su 0343 0.4 12 1103 3.5 107 1619 0.7 21 2324 2.9 88	
11 M 0231 -0.1 -3 0919 3.9 119 1441 0.0 0 2135 4.1 125		26 Tu 0323 0.0 0 1000 4.1 125 1542 0.3 9 2218 3.9 119		11 Th 0332 -0.3 -9 1028 4.4 134 1604 0.0 0 2249 3.9 119		26 F 0345 0.3 9 1054 3.8 116 1616 0.7 21 2311 3.2 98		11 Su 0452 0.0 0 1200 4.3 131 1749 0.3 9		26 M 0423 0.6 18 1152 3.3 101 1704 0.8 24	
12 Tu 0311 -0.2 -6 1004 3.9 119 1528 0.1 3 2221 4.0 122		27 W 0356 0.2 6 1046 3.9 119 1620 0.6 18 2303 3.6 110		12 F 0419 -0.2 -6 1122 4.3 131 1659 0.2 6 2344 3.7 113		27 Sa 0420 0.5 15 1141 3.5 107 1658 0.9 27		12 M 0029 3.5 107 0554 0.2 6 1303 4.1 125 1905 0.5 15		27 Tu 0019 2.8 85 0510 0.7 21 1248 3.2 98 1758 0.9 27	
13 W 0354 -0.2 -6 1053 4.0 122 1618 0.1 3 2310 3.8 116		28 Th 0430 0.4 12 1134 3.7 113 1700 0.8 24 2350 3.3 101		13 Sa 0510 -0.1 -3 1220 4.2 128 1801 0.4 12		28 Su 0000 3.0 91 0500 0.7 21 1233 3.4 104 1743 1.0 30		13 Tu 0134 3.4 104 0707 0.4 12 1409 4.0 122 2034 0.5 15		28 W 0119 2.8 85 0607 0.8 24 1347 3.2 98 1901 0.9 27	
14 Th 0440 -0.1 -3 1145 4.0 122 1713 0.3 9		29 F 0505 0.5 15 1224 3.6 110 1744 1.0 30		14 Su 0045 3.5 107 0608 0.1 3 1322 4.2 128 1913 0.5 15		29 M 0055 2.8 85 0548 0.8 24 1329 3.3 101 1840 1.1 34		14 W 0240 3.4 104 0836 0.5 15 1512 4.0 122 2152 0.5 15		29 Th 0220 2.9 88 0714 0.8 24 1446 3.3 101 2009 0.8 24	
15 F 0005 3.6 110 0530 0.0 0 1242 4.1 125 1815 0.4 12		30 Sa 0040 3.0 91 0548 0.7 21 1316 3.5 107 1835 1.1 34		15 M 0150 3.4 104 0715 0.3 9 1426 4.2 128 2037 0.5 15		30 Tu 0155 2.8 85 0645 0.9 27 1427 3.3 101 1948 1.1 34		15 Th 0341 3.6 110 0957 0.4 12 1610 4.1 125 2249 0.3 9		30 F 0316 3.1 94 0827 0.7 21 1540 3.5 107 2114 0.5 15	
		31 Su 0135 2.9 88 0634 0.8 24 1411 3.4 104 1938 1.2 37				31 W 0255 2.9 88 0751 0.9 27 1523 3.5 107 2100 0.9 27					

Time meridian 75° W. 0000 is midnight. 1200 is noon.  
Heights are referred to mean lower low water which is the chart datum of soundings.

# Newport, R.I., 1994

## Times and Heights of High and Low Waters

October				November				December			
Time	Height	Time	Height	Time	Height	Time	Height	Time	Height	Time	Height
1 Sa 0408 3.5 107 0935 0.4 12 1631 3.8 116 2210 0.2 6		16 Su 0503 4.0 122 1137 0.2 6 1724 3.8 116 2341 0.1 3		1 Tu 0516 4.4 134 1107 -0.3 -9 1740 4.1 125 2317 -0.6 -18		16 W 0601 4.0 122 1221 0.2 6 1820 3.5 107		1 Th 0544 4.7 143 1145 -0.6 -18 1809 4.0 122 2347 -0.8 -24		16 F 0616 3.9 119 1226 0.2 6 1836 3.3 101	
2 Su 0457 3.9 119 1035 0.1 3 1719 4.1 125 2300 -0.1 -3		17 M 0547 4.1 125 1213 0.1 3 1807 3.8 116		2 W 0605 4.8 146 1200 -0.6 -18 1829 4.2 128		17 Th 0603 0.1 3 0642 4.1 125 1248 0.1 3 1901 3.5 107		2 F 0635 5.0 152 1239 -0.8 -24 1900 4.1 125		17 Sa 0608 0.0 0 0658 3.9 119 1256 0.1 3 1918 3.3 101	
3 M 0544 4.3 131 1128 -0.2 -6 1806 4.3 131 2346 -0.4 -12		18 Tu 0609 0.1 3 0628 4.2 128 1243 0.1 3 1847 3.8 116		3 Th 0607 -0.8 -24 0654 5.0 152 1252 -0.8 -24 1918 4.3 131		18 F 0633 0.0 0 0721 4.1 125 1316 0.1 3 1941 3.4 104		3 Sa 0641 -0.9 -27 0726 5.0 152 1331 -0.8 -24 1952 4.2 128		18 Su 0643 0.0 0 0738 4.0 122 1327 0.0 0 1959 3.3 101	
4 Tu 0630 4.7 143 1219 -0.5 -15 1853 4.4 134		19 W 0636 0.0 0 0708 4.3 131 1311 0.1 3 1927 3.8 116		4 F 0657 -0.9 -27 0744 5.1 155 1342 -0.8 -24 2009 4.3 131		19 Sa 0705 0.0 0 0801 4.0 122 1346 0.1 3 2021 3.4 104		4 Su 0733 -0.9 -27 0818 5.0 152 1421 -0.8 -24 2044 4.1 125		19 M 0720 -0.1 -3 0818 3.9 119 1359 -0.1 -3 2040 3.3 101	
5 W 0632 -0.7 -21 0717 4.9 149 1307 -0.7 -21 1940 4.4 134		20 Th 0703 0.0 0 0747 4.2 128 1339 0.1 3 2006 3.6 110		5 Sa 0746 -0.9 -27 0835 5.1 155 1433 -0.7 -21 2101 4.1 125		20 Su 0841 3.9 119 1418 0.1 3 2102 3.3 101		5 M 0725 -0.8 -24 0809 4.7 143 1511 -0.6 -18 2136 4.0 122		20 Tu 0757 -0.1 -3 0858 3.8 116 1433 -0.1 -3 2121 3.3 101	
6 Th 0718 -0.8 -24 0804 5.0 152 1356 -0.7 -21 2028 4.4 134		21 F 0732 0.0 0 0826 4.1 125 1408 0.2 6 2045 3.5 107		6 Su 0727 -0.7 -21 0827 4.8 146 1525 -0.5 -15 2155 4.0 122		21 M 0821 0.1 3 0921 3.8 116 1452 0.2 6 2145 3.1 94		6 Tu 0838 -0.5 -15 1002 4.4 134 1602 -0.4 -12 2230 3.8 116		21 W 0836 -0.1 -3 0939 3.7 113 1510 -0.1 -3 2204 3.2 98	
7 F 0704 -0.8 -24 0854 5.0 152 1446 -0.6 -18 2119 4.2 128		22 Sa 0804 0.1 3 0808 4.0 122 1439 0.3 9 2126 3.3 101		7 M 0830 -0.4 -12 1022 4.5 137 1620 -0.2 -6 2251 3.8 116		22 Tu 1003 3.8 110 1530 0.2 6 2229 3.0 91		7 W 0412 -0.2 -6 1055 4.1 125 1653 -0.1 -3 2326 3.7 113		22 Th 1021 3.5 107 1549 -0.1 -3 2249 3.2 98	
8 Sa 0752 -0.6 -18 0945 4.8 146 1538 -0.4 -12 2212 4.0 122		23 Su 0837 0.2 6 0947 3.8 116 1513 0.4 12 2209 3.1 94		8 Tu 0428 -0.1 -3 1119 4.2 128 1720 0.0 0 2351 3.6 110		23 W 1047 3.4 104 1611 0.3 9 2317 3.0 91		8 Th 0510 0.1 3 1150 3.7 113 1747 0.1 3		23 F 0403 0.0 0 1107 3.4 104 1632 -0.1 -3 2339 3.3 101	
9 Su 0843 -0.4 -12 1041 4.6 140 1634 -0.1 -3 2310 3.7 113		24 M 0813 0.3 9 1030 3.5 107 1552 0.5 15 2255 2.9 88		9 W 0531 0.2 6 1219 3.9 119 1827 0.3 9		24 Th 1136 3.3 101 1657 0.3 9		9 F 0623 3.5 107 1247 3.4 104 1845 0.3 9		24 Sa 0454 0.1 3 1158 3.2 98 1721 -0.1 -3	
10 M 0438 -0.1 -3 1140 4.3 131 1737 0.2 6		25 Tu 0854 0.5 15 1117 3.3 101 1635 0.8 18 2347 2.8 85		10 Th 0553 3.5 107 0649 0.4 12 1321 3.6 110 1942 0.4 12		25 F 0610 3.0 91 0514 0.4 12 1230 3.2 98 1749 0.3 9		10 Sa 0733 3.4 104 0733 0.6 18 1344 3.1 94 1947 0.4 12		25 Su 0634 3.3 101 0552 0.2 6 1255 3.1 94 1816 -0.1 -3	
11 Tu 0912 3.5 107 0543 0.2 6 1243 4.0 122 1853 0.4 12		26 W 0442 0.6 18 1210 3.2 98 1725 0.6 18		11 F 0555 3.5 107 0820 0.5 15 1421 3.4 104 2052 0.4 12		26 Sa 0616 0.5 15 1329 3.2 98 1848 0.2 6		11 Su 0818 3.4 104 0856 0.6 18 1440 3.0 91 2048 0.5 15		26 M 0633 3.5 107 0658 0.2 6 1356 3.1 94 1917 -0.1 -3	
12 W 0717 3.4 104 0703 0.5 15 1348 3.8 116 2018 0.5 15		27 Th 0644 2.8 85 0538 0.7 21 1307 3.2 98 1822 0.6 18		12 Sa 0253 3.5 107 0936 0.5 15 1517 3.4 104 2148 0.4 12		27 Su 0205 3.3 101 0725 0.4 12 1428 3.2 98 1950 0.1 3		12 M 0812 3.4 104 1002 0.6 18 1533 3.0 91 2139 0.4 12		27 Tu 0233 3.7 113 0811 0.2 6 1458 3.2 98 2023 -0.2 -6	
13 Th 0821 3.5 107 0838 0.5 15 1450 3.7 113 2131 0.4 12		28 F 0143 3.0 91 0643 0.7 21 1407 3.2 98 1926 0.5 15		13 Su 0346 3.6 110 1034 0.4 12 1609 3.3 101 2231 0.3 9		28 M 0303 3.7 113 0837 0.2 6 1526 3.4 104 2053 -0.1 -3		13 Tu 0403 3.5 107 1051 0.5 15 1623 3.0 91 2220 0.4 12		28 W 0333 4.0 122 0925 0.0 0 1559 3.3 101 2130 -0.4 -12	
14 F 0321 3.6 110 0955 0.4 12 1547 3.7 113 2225 0.3 9		29 Sa 0241 3.2 98 0755 0.6 18 1504 3.4 104 2030 0.3 9		14 M 0435 3.8 116 1117 0.3 9 1655 3.4 104 2305 0.2 6		29 Tu 0358 4.0 122 0945 0.0 0 1622 3.6 110 2154 -0.4 -12		14 W 0450 3.8 110 1128 0.4 12 1709 3.1 94 2257 0.3 9		29 Th 0431 4.3 131 1034 -0.2 -6 1656 3.8 110 2234 -0.6 -18	
15 Sa 0414 3.8 116 1052 0.3 9 1638 3.8 116 2307 0.2 6		30 Su 0335 3.8 110 0906 0.3 9 1558 3.6 110 2130 0.0 0		15 Tu 0519 3.9 119 1152 0.3 9 1739 3.4 104 2334 0.1 3		30 W 0452 4.4 134 1048 -0.3 -9 1718 3.8 116 2252 -0.6 -18		15 Th 0534 3.8 116 1156 0.3 9 1753 3.2 98 2332 0.1 3		30 F 0526 4.5 137 1135 -0.5 -15 1751 3.8 116 2335 -0.7 -21	
		31 M 0427 4.0 122 1010 0.0 0 1650 3.8 116 2225 -0.3 -9								31 Sa 0619 4.7 143 1229 -0.7 -21 1844 4.0 122	

Time meridian 75° W. 0000 is midnight. 1200 is noon.  
 Heights are referred to mean lower low water which is the chart datum of soundings.

TABLE 2 - TIDAL DIFFERENCES AND OTHER CONSTANTS

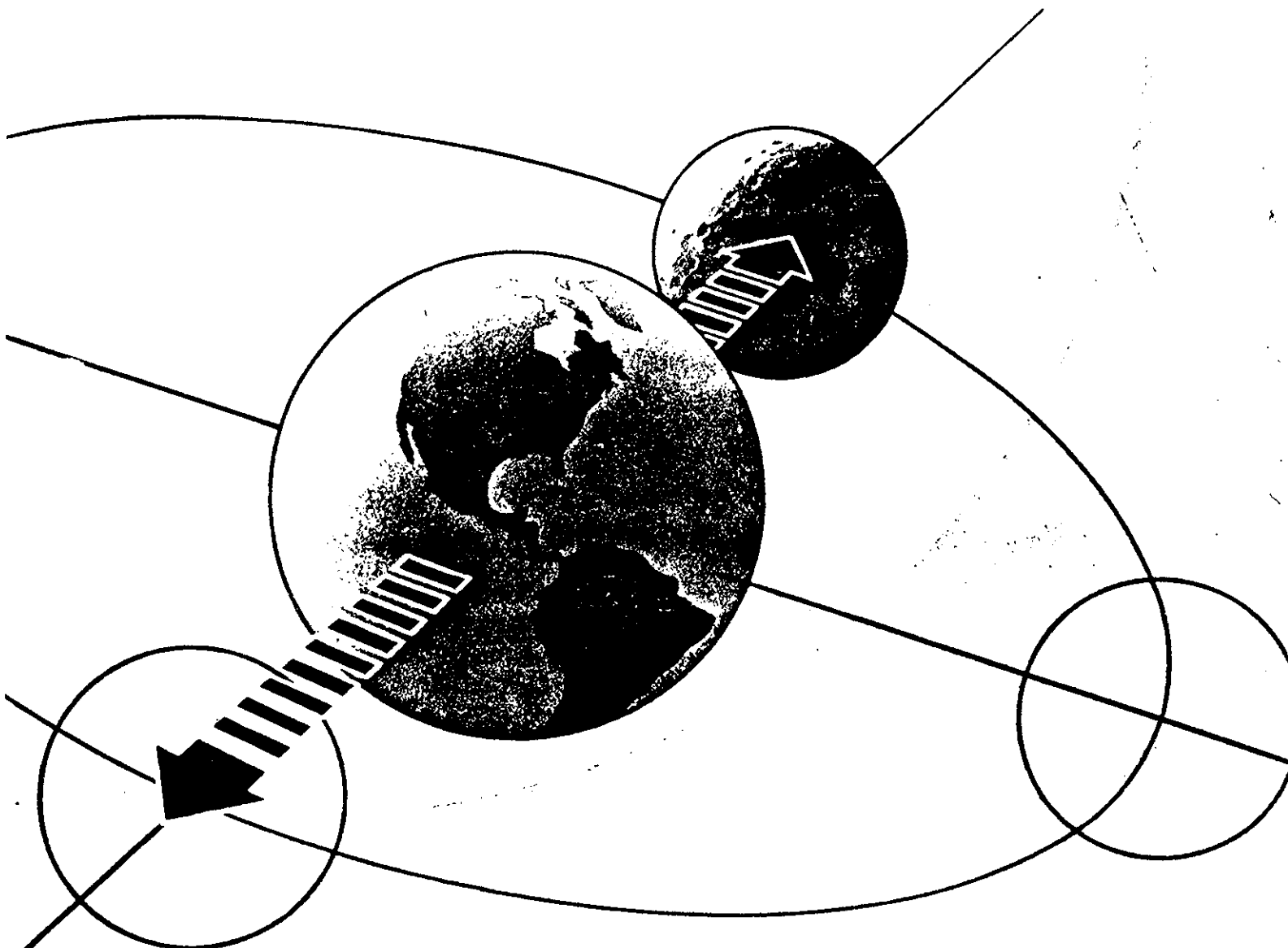
No.	PLACE	POSITION		DIFFERENCES				RANGES		Mean Tide Level
		Latitude	Longitude	Time		Height		Mean	Spring	
				High Water	Low Water	High Water	Low Water			
		North	West	h m	h m	ft	ft	ft	ft	
MASSACHUSETTS—cont. Vineyard Sound Time meridian, 75° W										
on Newport, p.40										
1085	Nobska Point	41° 31'	70° 39'	+0 41	+2 05	+0.43	+0.43	1.5	1.9	0.8
	Woods Hole									
1087	Little Harbor	41° 31'	70° 40'	+0 32	+2 21	+0.40	+0.40	1.4	1.8	0.8
1089	Oceanographic Institution	41° 32'	70° 40'	+0 22	+1 59	+0.52	+0.50	1.6	2.3	1.0
1091	Uncatena Island (south side)	41° 31'	70° 42'	+0 12	+0 22	+1.02	+1.02	3.6	4.5	1.9
1093	Tarpaulin Cove	41° 28'	70° 46'	+0 11	+1 23	+0.54	+0.54	1.9	2.4	1.0
	Quicks Hole									
1095	South side	41° 26'	70° 51'	-0 10	+0 09	+0.71	+0.71	2.5	3.1	1.3
1097	Middle	41° 27'	70° 51'	0 00	+0 10	+0.85	+0.85	3.0	3.7	1.6
1099	North side	41° 27'	70° 51'	-0 08	-0 08	+0.99	+0.99	3.5	4.4	1.8
Buzzards Bay										
1101	Cuttyhunk Pond entrance	41° 25'	70° 55'	+0 01	+0 01	+0.97	+0.97	3.4	4.2	1.8
1103	Penikese Island	41° 27'	70° 55'	-0 17	-0 16	+0.97	+0.97	3.4	4.2	1.8
1105	Kettle Cove	41° 29'	70° 47'	+0 09	+0 02	+1.08	+1.08	3.8	4.7	2.1
1107	Chappaquod Point, West Falmouth Harbor	41° 36'	70° 39'	+0 10	+0 20	+1.10	+1.07	3.9	4.9	2.1
1109	West Falmouth Harbor	41° 38'	70° 39'	+0 21	+0 18	+1.14	+1.14	4.0	5.0	2.2
1111	Barlows Landing, Pocasset Harbor	41° 41'	70° 38'	+0 24	+0 18	+1.14	+1.14	4.0	5.0	2.2
1113	Abies Ledge	41° 42'	70° 40'	+0 11	+0 16	+1.11	+1.11	3.9	4.9	2.2
1115	Monument Beach	41° 43'	70° 37'	+0 23	+0 18	+1.14	+1.14	4.0	5.0	2.2
1117	Cape Cod Canal, RR. bridge <6>	41° 44'	70° 37'	+1 15	—	+0.99	+0.99	3.5	4.1	1.9
1119	Great Hill	41° 43'	70° 43'	+0 12	+0 11	+1.15	+1.21	4.0	5.0	2.2
1121	Wareham, Wareham River	41° 45'	70° 43'	+0 22	+0 16	+1.16	+1.16	4.1	5.1	2.2
1123	Bird Island	41° 40'	70° 43'	+0 05	-0 02	+1.19	+1.19	4.2	5.2	2.3
1125	Marion, Sippican Harbor	41° 42'	70° 46'	+0 10	+0 12	+1.13	+1.29	4.0	4.9	2.2
1127	Mattapoisett, Mattapoisett Harbor	41° 39'	70° 49'	+0 11	+0 20	+1.09	+1.00	3.9	4.8	2.1
1129	West Island (west side)	41° 36'	70° 50'	+0 09	+0 08	+1.05	+1.05	3.7	4.6	1.9
1131	Clarks Point	41° 36'	70° 54'	+0 14	+0 24	+1.06	+1.00	3.6	4.5	2.0
1133	New Bedford	41° 38'	70° 55'	+0 07	+0 07	+1.05	+1.05	3.7	4.6	1.9
1135	Belleville, Acushnet River	41° 40'	70° 55'	+0 07	+0 09	+1.08	+1.08	3.8	4.7	2.1
1137	South Dartmouth, Apponansett Bay	41° 35'	70° 57'	+0 25	+0 33	+1.05	+1.05	3.7	4.6	1.9
1139	Dumping Rocks	41° 32'	70° 55'	+0 01	-0 02	+1.05	+1.05	3.7	4.6	1.9
	Westport River									
1141	Westport Harbor	41° 30'	71° 08'	+0 09	+0 33	+0.85	+0.85	3.0	3.7	1.6
1143	Hix Bridge, East Branch	41° 34'	71° 04'	+1 40	+2 30	+0.77	+0.77	2.7	3.4	1.4
RHODE ISLAND, Narragansett Bay										
1145	Sakonnet	41° 28'	71° 12'	-0 13	-0 01	+0.86	+0.86	3.1	3.9	1.7
1147	Anthony Point, Sakonnet River	41° 38'	71° 13'	-0 02	-0 02	+1.09	+1.07	3.6	4.6	2.1
1149	Beaverfall Point	41° 27'	71° 24'	-0 05	+0 04	+0.99	+1.00	3.5	4.3	1.9
1151	Castle Hill	41° 28'	71° 22'	-0 05	+0 12	+0.94	+0.93	3.3	4.1	1.8
1153	NEWPORT	41° 30'	71° 20'	Daily predictions				3.5	4.4	1.9
1155	Conanicut Point	41° 34'	71° 22'	+0 07	-0 06	+1.07	+1.07	3.6	4.7	2.0
1157	Prudence Island, (south end)	41° 35'	71° 19'	+0 08	-0 04	+1.06	+1.07	3.6	4.6	2.0
1159	Bristol Point	41° 39'	71° 16'	+0 18	+0 07	+1.14	+1.14	4.0	5.0	2.1
1161	Bristol Highlands	41° 42'	71° 18'	+0 08	-0 07	+1.16	+1.21	4.2	5.2	2.2
1163	Bristol Ferry	41° 38'	71° 15'	+0 16	+0 01	+1.16	+1.14	4.1	5.1	2.2
1165	Fall River, State Pier	41° 42'	71° 10'	+0 19	-0 01	+1.25	+1.25	4.4	5.5	2.4
RHODE ISLAND and MASSACHUSETTS Narragansett Bay—cont.										
1167	Fall River, Massachusetts	41° 44'	71° 08'	+0 28	+0 29	+1.26	+1.26	4.4	5.5	2.4
1169	Taunton, Taunton River, Massachusetts	41° 53'	71° 08'	+1 06	+2 21	+0.79	+0.79	2.8	3.5	1.5
1171	Bristol, Bristol Harbor	41° 40'	71° 17'	+0 13	0 00	+1.16	+1.14	4.1	5.1	2.2
1173	Warren	41° 44'	71° 17'	+0 18	-0 01	+1.31	+1.29	4.6	5.7	2.5
1175	Nayatt Point	41° 43'	71° 20'	+0 09	-0 02	+1.31	+1.29	4.6	5.7	2.5
1177	Providence, State Pier #1	41° 48'	71° 24'	+0 11	-0 01	+1.26	+1.29	4.5	5.6	2.4
1179	Pawtucket, Seekonk River	41° 52'	71° 23'	+0 18	+0 09	+1.31	+1.29	4.6	5.8	2.5
1181	East Greenwich	41° 40'	71° 27'	+0 13	+0 03	+1.14	+1.14	4.0	5.0	2.1
1183	Wickford	41° 34'	71° 27'	+0 09	+0 02	+1.08	+1.07	3.8	4.7	2.0
1185	Narragansett Pier	41° 25'	71° 27'	-0 11	+0 11	+0.91	+0.93	3.2	4.0	1.7
RHODE ISLAND, Outer Coast										
1187	Point Judith Harbor of Refuge	41° 22'	71° 29'	-0 10	+0 17	+0.86	+0.86	3.1	3.9	1.6
1189	Block Island (Great Salt Pond)	41° 11'	71° 35'	+0 02	+0 07	+0.74	+0.71	2.6	3.2	1.4
1191	Block Island (Old Harbor)	41° 10'	71° 33'	-0 17	+0 12	+0.83	+0.86	2.9	3.6	1.5
1193	Watch Hill Point	41° 18'	71° 52'	+0 41	+1 16	+0.74	+0.71	2.6	3.2	1.4
on New London, p.44										
1195	Westerly, Pawcatuck River	41° 23'	71° 50'	-0 21	+0 03	+1.02	+1.00	2.8	3.1	1.5
CONNECTICUT, Long Island Sound										
1197	Stonington, Fishers Island Sound	41° 20'	71° 54'	-0 32	-0 41	+1.05	+1.05	2.7	3.2	1.5
1199	Noank, Mystic River entrance	41° 19'	71° 59'	-0 22	-0 08	+0.89	+0.90	2.3	2.7	1.4
1201	West Harbor, Fishers Island, N.Y.	41° 16'	72° 00'	0 00	-0 06	+0.97	+0.97	2.5	3.0	1.4
1203	Silver Eel Pond, Fishers Island, N.Y.	41° 15'	72° 02'	-0 16	-0 04	+0.89	+0.89	2.3	2.7	1.3

Endnotes can be found at the end of table 2.

Tidal Current Tables 1994



# Atlantic Coast of North America



U.S. DEPARTMENT OF COMMERCE  
National Oceanic and Atmospheric Administration  
National Ocean Service



## TABLE 1.— DAILY CURRENT PREDICTIONS

### EXPLANATION OF TABLE

This table gives the predicted times of slack water and the predicted times and speeds of maximum current-flood and ebb-for each day of the year at a number of stations on the Atlantic coast of North America. The times are given in hours and minutes and the speeds in knots.

**Time.**—The kind of time used for the predictions at each reference station is indicated by the time meridian at the bottom of each page.

**Slack water and maximum current.**—The columns headed "Slack" contain the predicted times at which there is no current; or, in other words, the times at which the current has stopped setting in a given direction and is about to begin to set in the opposite direction. Offshore, where the current is rotary, slack water denotes the time of minimum current. Beginning with the slack water before flood the current increases in speed until the strength or maximum speed of the flood current is reached; it then decreases until the following slack water or slack before ebb. The ebb current now begins, increases to a maximum speed, and then decreases to the next slack. The predicted times and speeds of maximum current are given in the columns headed "Maximum". Flood speeds are marked with an "F", the ebb speeds with an "E". An entry in the "Slack" column will be slack, flood begins if the maximum current which follows it is marked "F". Otherwise the entry will be slack, ebb begins.

**Direction of set.**—The terms flood and ebb do not in all cases clearly indicate the direction of the current, the approximate direction toward which the currents flow are given at the top of each page to distinguish the two streams.

**Number of slacks and strengths.**—There are usually four slacks and four maximums each day. If one is missing in a given day, it will occur soon after midnight as the first slack or maximum of the following day. At some stations where the diurnal inequality is large, there may be on certain days a continuous flood or ebb current with varying speed throughout half the day giving only two slacks and two maximums on that particular day.

**Current and tide.**—It is important to notice that the predicted slacks and strengths given in this table refer to the horizontal motion of the water and not to the vertical rise and fall of the tide. The relation of current to tide is not constant, but varies from place to place, and the time of slack water does not generally coincide with the time of high or low water, nor does the time of maximum speed of the current usually coincide with the time of most rapid change in the vertical height of the tide. At stations located on a tidal river or bay the time of slack water may differ from 1 to 3 hours from the time of high or low water. The times of high and low waters are given in the tide tables published by the National Ocean Service.

**Variations from predictions.**—In using this table, bear in mind that actual times of slack or maximum occasionally differ from the predicted times by as much as half an hour and in rare instances the difference may be as much as an hour. Comparisons of predicted with observed times of slack water indicate that more than 90 percent of the slack waters occurred within half an hour of the predicted times. To make sure, therefore, of getting the full advantage of a favorable current or slack water, the navigator should reach the entrance or strait at least half an hour before the predicted time of the desired condition of current. Currents are frequently disturbed by wind or variations in river discharge. On days when the current is affected by such disturbing influences the times and speeds will differ from those given in the table, but local knowledge will enable one to make proper allowance for these effects.

# Pollock Rip Channel, Massachusetts, 1994

F—Flood, Dir. 035° True    E—Ebb, Dir. 225° True

April				May				June			
Slack	Maximum	Slack	Maximum	Slack	Maximum	Slack	Maximum	Slack	Maximum	Slack	Maximum
h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
knots	knots	knots	knots	knots	knots	knots	knots	knots	knots	knots	knots
1 F	0033 0315 2.0E 0627 0949 2.2F 1314 1551 1.8E 1905 2220 1.8F	16 Sa	0039 0318 1.7E 0626 0945 2.0F 1316 1548 1.6E 1858 2206 1.7F	1 Su	0115 0358 1.7E 0711 1047 2.1F 1401 1643 1.6E 1956 2322 1.7F	16 M	0056 0335 1.8E 0641 1001 2.0F 1335 1609 1.7E 1919 2225 1.7F	1 W	0257 0545 1.5E 0850 1232 2.0F 1532 1826 1.6E 2133	16 Th	0209 0448 1.8E 0754 1111 2.1F 1443 1721 1.8E 2032 2341 1.9F
2 Sa	0133 0414 1.8E 0728 1059 2.0F 1418 1656 1.6E 2010 2335 1.7F	17 Su	0127 0405 1.7E 0713 1033 1.9F 1406 1638 1.6E 1949 2257 1.6F	2 M	0219 0504 1.6E 0815 1158 2.0F 1504 1753 1.5E 2102	17 Tu	0146 0425 1.7E 0731 1051 2.0F 1425 1700 1.7E 2011 2318 1.7F	2 Th	0106 1.8F 0358 0649 1.5E 0950 1331 2.0F 1628 1926 1.6E 2230	17 F	0306 0543 1.8E 0850 1208 2.0F 1536 1815 1.8E 2128
3 Su	0238 0521 1.6E 0834 1216 1.9F 1525 1810 1.5E 2121	18 M	0219 0456 1.6E 0804 1127 1.9F 1459 1732 1.6E 2044 2354 1.6F	3 Tu	0034 1.7F 0324 0615 1.5E 0921 1306 2.0F 1606 1903 1.5E 2207	18 W	0240 0518 1.7E 0825 1145 2.0F 1517 1753 1.7E 2105	3 F	0204 1.9F 0456 0751 1.5E 1048 1427 1.9F 1720 2021 1.6E 2324	18 Sa	0042 1.9F 0405 0642 1.7E 0950 1308 2.0F 1632 1912 1.8E 2226
4 M	0054 1.7F 0346 0636 1.5E 0945 1331 1.9F 1633 1928 1.5E 2232	19 Tu	0314 0551 1.6E 0859 1224 1.9F 1553 1827 1.6E 2140	4 W	0140 1.8F 0429 0726 1.5E 1026 1408 2.0F 1705 2007 1.6E 2308	19 Th	0015 1.7F 0336 0614 1.7E 0921 1243 2.0F 1610 1848 1.7E 2201	4 Sa	0258 2.0F 0552 0847 1.5E 1143 1519 1.9F 1810 2111 1.7E	19 Su	0146 1.9F 0506 0742 1.7E 1052 1411 1.9F 1728 2010 1.8E 2324
5 Tu	0206 1.7F 0454 0753 1.5E 1054 1438 2.0F 1737 2039 1.5E 2338	20 W	0054 1.6F 0410 0647 1.6E 0957 1323 1.9F 1647 1923 1.6E 2236	5 Th	0240 1.9F 0530 0831 1.5E 1127 1504 2.1F 1800 2103 1.6E	20 F	0115 1.8F 0434 0711 1.7E 1020 1341 2.0F 1704 1943 1.8E 2256	5 Su	0348 2.0F 0644 0938 1.5E 1234 1607 1.9F 1857 2156 1.7E	20 M	0250 2.0F 0607 0844 1.7E 1153 1515 1.9F 1824 2109 1.9E
6 W	0309 1.8F 0557 0901 1.6E 1158 1536 2.1F 1834 2138 1.6E	21 Th	0154 1.7F 0506 0745 1.7E 1054 1421 2.0F 1739 2018 1.7E 2330	6 F	0333 2.0F 0626 0927 1.6E 1221 1556 2.1F 1849 2153 1.7E	21 Sa	0214 1.9F 0531 0809 1.8E 1118 1439 2.0F 1756 2038 1.9E 2350	6 M	0434 2.1F 0731 1024 1.6E 1321 1651 1.9F 1941 2237 1.7E	21 Tu	0352 2.1F 0706 0945 1.7E 1254 1616 1.9F 1919 2206 1.9E
7 Th	0404 2.0F 0654 0958 1.7E 1254 1628 2.2F 1924 2228 1.7E	22 F	0249 1.9F 0600 0840 1.8E 1149 1514 2.1F 1829 2110 1.9E	7 Sa	0422 2.1F 0716 1015 1.6E 1310 1642 2.1F 1934 2235 1.8E	22 Su	0312 2.1F 0627 0906 1.8E 1215 1535 2.0F 1848 2131 2.0E	7 Tu	0517 2.1F 0816 1105 1.6E 1404 1732 1.9F 2022 2314 1.8E	22 W	0451 2.2F 0803 1044 1.8E 1352 1714 1.9F 2013 2301 1.9E
8 F	0452 2.1F 0744 1047 1.7E 1342 1714 2.2F 2009 2310 1.8E	23 Sa	0341 2.0F 0652 0933 1.9E 1243 1604 2.2F 1918 2200 2.0E	8 Su	0507 2.1F 0802 1058 1.7E 1355 1724 2.0F 2015 2313 1.8E	23 M	0407 2.2F 0722 1002 1.9E 1311 1629 2.1F 1939 2224 2.0E	8 W	0556 2.1F 0857 1142 1.6E 1445 1809 1.9F 2102 2349 1.8E	23 Th	0547 2.3F 0858 1140 1.8E 1448 1809 1.9F 2106 2355 2.0E
9 Sa	0536 2.2F 0829 1128 1.8E 1425 1756 2.2F 2049 2347 1.8E	24 Su	0430 2.2F 0743 1024 2.0E 1334 1652 2.2F 2005 2248 2.1E	9 M	0547 2.2F 0844 1136 1.7E 1435 1803 2.0F 2054 2346 1.8E	24 Tu	0500 2.3F 0815 1056 1.9E 1405 1722 2.1F 2029 2315 2.1E	9 Th	0631 2.1F 0937 1218 1.7E 1524 1843 1.8F 2141	24 F	0640 2.3F 0950 1234 1.8E 1541 1902 1.9F 2158
10 Su	0616 2.2F 0910 1204 1.8E 1504 1833 2.1F 2126	25 M	0517 2.3F 0833 1114 2.1E 1424 1739 2.3F 2051 2335 2.2E	10 Tu	0624 2.2F 0924 1210 1.7E 1513 1838 1.9F 2132	25 W	0552 2.4F 0908 1149 2.0E 1458 1814 2.1F 2120	10 F	0024 1.8E 0334 0704 2.2F 1017 1254 1.7E 1602 1916 1.8E 2220	25 Sa	0047 2.0E 0357 0732 2.3F 1041 1325 1.8E 1633 1954 1.9F 2249
11 M	0019 1.8E 0321 0652 2.2F 0949 1237 1.8E 1540 1907 2.0F 2202	26 Tu	0605 2.4F 0922 1204 2.1E 1514 1826 2.2F 2139	11 W	0018 1.8E 0326 0658 2.1F 1003 1243 1.7E 1549 1910 1.9F 2209	26 Th	0006 2.1E 0317 0644 2.4F 1001 1242 1.9E 1551 1907 2.0F 2211	11 Sa	0101 1.9E 0410 0736 2.2F 1056 1331 1.8E 1640 1949 1.8F 2300	26 Su	0138 1.9E 0447 0822 2.3F 1132 1416 1.8E 1724 2045 1.9F 2341
12 Tu	0049 1.8E 0355 0724 2.1F 1027 1309 1.7E 1615 1938 1.9F 2239	27 W	0023 2.2E 0333 0653 2.5F 1013 1254 2.1E 1604 1916 2.2F 2228	12 Th	0052 1.8E 0401 0729 2.1F 1041 1318 1.7E 1626 1941 1.8F 2247	27 F	0057 2.0E 0408 0738 2.4F 1054 1335 1.9E 1645 2001 2.0F 2304	12 Su	0141 1.9E 0449 0811 2.2F 1137 1411 1.8E 1721 2026 1.8F 2342	27 M	0228 1.8E 0538 0913 2.2F 1221 1506 1.7E 1814 2138 1.9F
13 W	0121 1.8E 0429 0755 2.1F 1106 1343 1.7E 1652 2008 1.9F 2316	28 Th	0112 2.2E 0423 0744 2.4F 1106 1346 2.0E 1657 2009 2.1F 2320	13 F	0127 1.8E 0436 0801 2.1F 1121 1356 1.7E 1705 2015 1.8F 2327	28 Sa	0150 2.0E 0501 0832 2.3F 1148 1429 1.8E 1740 2058 1.9F 2359	13 M	0223 1.9E 0530 0849 2.2F 1219 1454 1.8E 1803 2108 1.8F	28 Tu	0320 1.8E 0629 1004 2.1F 1312 1556 1.7E 1906 2232 1.8F
14 Th	0156 1.8E 0505 0827 2.0F 1146 1421 1.7E 1730 2042 1.9F 2356	29 F	0204 2.1E 0515 0840 2.3F 1201 1440 1.9F 1752 2106 1.9F	14 Sa	0206 1.8E 0515 0836 2.1F 1203 1437 1.7E 1746 2053 1.7F	29 Su	0244 1.9E 0555 0930 2.2F 1243 1525 1.7E 1836 2158 1.8F	14 Tu	0308 1.9E 0614 0932 2.2F 1304 1540 1.9E 1849 2154 1.9F	29 W	0413 1.7E 0721 1058 2.0F 1403 1649 1.8E 1959 2328 1.8F
15 F	0234 1.8E 0543 0904 2.0F 1229 1503 1.7E 1812 2121 1.7F	30 Sa	0259 1.9E 0611 0940 2.2F 1300 1539 1.7E 1852 2211 1.8F	15 Su	0249 1.8E 0556 0916 2.1F 1247 1521 1.7E 1831 2136 1.7F	30 M	0341 1.7E 0652 1030 2.1F 1339 1624 1.6E 1935 2301 1.8F	15 W	0356 1.9E 0702 1019 2.1F 1352 1629 1.8E 1939 2245 1.9F	30 Th	0508 1.6E 0815 1153 1.9F 1454 1742 1.6E 2053
						31 Tu	0442 1.6E 0750 1131 2.0F 1436 1725 1.6E 2034				

meridian 75° W. 0000 is midnight. 1200 is noon.

# Pollock Rip Channel, Massachusetts, 1994

F—Flood, Dir. 035° True    E—Ebb, Dir. 225° True

January						February						March													
Slack			Maximum			Slack			Maximum			Slack			Maximum			Slack			Maximum				
	h m	knots		h m	knots		h m	knots		h m	knots		h m	knots		h m	knots		h m	knots		h m	knots		
1 Sa	0509	0201 2.0E	16 Su	0015 0258 1.7E	17 Tu	0028 0308 2.1E	16 W	0105 0343 1.7E	1 Tu	0503 0815 2.4F	16 W	0537 0858 2.0F	2 Su	0008 0245 2.0E	17 M	0059 0340 1.7E	2 W	0118 0359 2.0E	17 Th	0151 0428 1.6E	2 W	0002 0243 2.2E	17 Th	0029 0306 1.8E	
	0554 0814 2.0F			0606 0930 1.9F		0616 0925 2.2F		0655 1016 1.8F		1137 1419 2.2E		1213 1449 1.7E		0554 0859 2.0F		0650 1015 1.8F		0709 1021 2.1F		0741 1104 1.8F		0552 0905 2.3F		0617 0936 1.9F	
	1131 1415 2.1E			1228 1510 1.7E		1249 1530 2.1E		1331 1605 1.6E		1728 2038 2.3F		1758 2114 1.9F		1219 1502 2.1E		1317 1556 1.6E		1347 1625 1.9E		1422 1654 1.5E		1230 1510 2.1E		1258 1532 1.6E	
	1722 2038 2.4F			1819 2151 2.0F		1839 2151 2.2F		1914 2235 1.8F						1809 2124 2.3F		1905 2235 1.9F		1935 2249 2.0F		2004 2325 1.7F		1820 2131 2.2F		1841 2154 1.8E	
3 M	0055 0333 2.0E		18 Tu	0144 0425 1.6E	3 Th	0215 0454 1.9E	18 F	0241 0518 1.6E	3 Th	0054 0335 2.0E	18 F	0113 0350 1.7E	4 Tu	0146 0425 1.9E	19 W	0233 0513 1.6E	4 F	0316 0556 1.7E	19 Sa	0334 0612 1.5E	4 F	0152 0433 1.8E	19 Sa	0202 0438 1.6E	
	0642 0948 2.0F			0737 1103 1.8F		0807 1125 2.0F		0832 1159 1.7F		0646 1002 2.2F		0701 1020 1.9F		0735 1044 2.0F		0827 1156 1.7F		0911 1240 1.9F		0926 1259 1.7F		0746 1109 2.0F		0749 1111 1.8F	
	1311 1553 2.0E			1408 1645 1.5E		1450 1726 1.7E		1516 1748 1.4E		1329 1606 1.9E		1346 1619 1.6E		1409 1648 1.9E		1501 1737 1.5E		1558 1834 1.5E		1613 1846 1.4E		1433 1709 1.6E		1439 1710 1.5E	
	1900 2215 2.2F			1953 2324 1.8F		2038 2356 1.8F		2058		1918 2231 1.9F		1929 2241 1.7F		1956 2312 2.1F		2046		2147		2156		2023 2343 1.7F		2021 2335 1.6F	
5 W	0241 0520 1.9E		20 Th	0324 0605 1.5E	5 Sa	0421 0705 1.6E	20 Su	0429 0708 1.5E	5 Sa	0256 0537 1.7E	20 Su	0255 0531 1.5E	6 Th	0340 0620 1.8E	21 F	0416 0700 1.5E	6 Su	0527 0818 1.6E	21 M	0523 0805 1.5E	6 Su	0404 0650 1.5E	21 M	0350 0627 1.5E	
	0833 1147 1.9F			0920 1253 1.7E		1020 1401 1.9F		1022 1359 1.8F		0852 1229 1.9F		0842 1209 1.8F		0934 1257 1.9F		1014 1351 1.8F		1129 1514 2.0F		1117 1456 1.9F		1004 1349 1.9F		0939 1310 1.8F	
	1511 1748 1.7E			1557 1833 1.4E		1708 1951 1.4E		1710 1945 1.4E		1543 1822 1.5E		1535 1806 1.4E		1616 1852 1.6E		1654 1932 1.4E		1816 2107 1.5E		1804 2042 1.5E		1653 1943 1.4E		1631 1904 1.4E	
	2057			2141		2259		2255		2134		2118		2203		2238					2350		2248		2217
7 F	0441 0723 1.7E		22 Sa	0509 0755 1.5E	7 M	0630 0929 1.6E	22 Tu	0615 0859 1.6E	7 M	0512 0809 1.5E	22 Tu	0446 0724 1.5E	8 Sa	0542 0830 1.8F	23 Su	0600 0847 1.7E	8 Tu	0728 1031 1.7E	23 W	0704 0948 1.8E	8 Tu	0617 0921 1.6E	23 W	0541 0821 1.6E	
	1039 1411 1.9F			1107 1446 1.8F		1234 1617 2.1F		1209 1546 2.0F		1115 1500 2.0F		1036 1409 1.8F		1143 1522 2.0F		1158 1537 1.9F		1333 1712 2.2F		1258 1630 2.1F		1220 1601 2.1F		1131 1504 2.0F	
	1723 2002 1.6E			1749 2029 1.4E		1918 2215 1.5E		1854 2134 1.6E		1800 2059 1.5E		1726 2002 1.5E		1828 2112 1.5E		1840 2122 1.5E		2012 2311 1.6E		1940 2220 1.7E		1900 2202 1.6E		1817 2055 1.6E	
	2311			2334				2358		2358		2313												2313	
9 Su	0018 0349 1.8F		24 M	0027 0356 1.7E	9 W	0208 0535 2.0F	24 Th	0128 0448 1.9F	9 W	0059 0427 1.9F	24 Th	0006 0327 1.8F	10 M	0120 0450 1.9F	25 Tu	0115 0440 1.8F	10 Th	0256 0622 2.0E	25 F	0211 0527 2.1F	10 Th	0150 0517 2.0F	25 F	0054 0414 2.0F	
	0642 0934 1.7E			0649 0936 1.7E		0822 1124 1.8E		0749 1034 1.9E		0715 1020 1.7E		0632 0914 1.8E		0739 1035 1.8E		0735 1021 1.8E		0910 1209 1.8E		0833 1118 2.1E		0806 1110 1.8E		0720 1003 1.9E	
	1245 1625 2.1F			1246 1623 2.0F		1424 1801 2.3F		1343 1711 2.2F		1317 1654 2.2F		1224 1552 2.1F		1342 1722 2.2F		1331 1705 2.1F		1510 1845 2.3F		1427 1750 2.4F		1407 1741 2.3F		1313 1637 2.2F	
	1929 2218 1.6E			1928 2210 1.6E		2101 2358 1.7E		2023 2303 1.9E		1953 2255 1.7E		1905 2145 1.8E		2025 2316 1.7E		2013 2253 1.7E		2145		2105 2345 2.0E		2039 2339 1.8E		1950 2231 2.0E	
11 Tu	0217 0544 1.9F		26 W	0159 0519 1.9F	11 F	0338 0704 2.0F	26 Sa	0253 0606 2.2F	11 F	0235 0602 2.1F	26 Sa	0140 0458 2.1F	12 W	0309 0634 1.8F	27 Th	0241 0556 2.0F	12 Sa	0418 0744 2.0F	12 Su	0334 0646 2.3F	12 Sa	0315 0642 1.8E	27 Su	0224 0540 2.3F	
	0832 1129 1.8E			0818 1103 1.9E		0954 1249 1.8E		0917 1201 2.2E		0852 1153 1.8E		0807 1051 2.1E		0922 1218 1.9E		0900 1144 2.0E		1036 1326 1.8E		1001 1245 2.3E		0934 1229 1.8E		0853 1137 2.2E	
	1435 1813 2.3F			1413 1742 2.2F		1552 1926 2.3F		1510 1828 2.4F		1451 1823 2.3F		1400 1720 2.3F		2116		2054 2333 1.8E		1631 2003 2.2E		1554 1909 2.5F		1451 1823 2.3F		1400 1720 2.3F	
	2116			2054 2333 1.8E		2225		2147		2120		2034 2316 2.1E												2034 2316 2.1E	
14 F	0440 0804 1.9E		29 Sa	0401 0710 2.2E	14 M	0533 0856 2.0F	14 M	0425 0752 2.1E	14 M	0425 0752 2.1E	29 Tu	0354 0709 2.5F	15 Sa	0523 0847 1.9F	30 Su	0443 0751 2.2F	15 Tu	0623 0934 1.9F	15 Tu	0500 0824 2.0F	15 Tu	0441 0757 2.4F	30 W	0441 0757 2.4F	
	1056 1345 1.8E			1024 1308 2.2E		1159 1440 1.8E		1047 1331 2.3E		1052 1336 1.8E		1029 1311 2.3E		1142 1427 1.8E		1108 1352 2.2E		1243 1521 1.7E		1131 1410 1.8E		1120 1401 2.2E		1120 1401 2.2E	
	1652 2027 2.2F			1616 1933 2.5F		1748 2114 2.0F		1640 1952 2.4F		1642 2007 2.0F		1621 1932 2.3F		2332		1700 2015 2.4F		1830 2152 1.9F		1719 2039 2.0F		1711 2021 2.2F		1711 2021 2.2F	
	2332			2257				2314		2310		2249				2341					2346		2339		2339
31 M	0528 0836 2.2F			1156 1440 2.2E																					
	1748 2101 2.4F			1748 2101 2.4F																					

Time meridian 75° W. 0000 is midnight. 1200 is noon.

# Pollock Rip Channel, Massachusetts, 1994

F—Flood, Dir. 035° True    E—Ebb, Dir. 225° True

July					August					September									
Slack		Maximum			Slack		Maximum			Slack		Maximum			Slack		Maximum		
	h	m	knots			h	m	knots			h	m	knots			h	m	knots	
1 F	0321	0026	1.8F	16 Sa	0239	0517	1.8E	1 M	0436	0135	1.8F	16 Tu	0431	0114	1.9F	1 F	0827	0328	2.1F
	0910	0606	1.5E		0824	1139	2.0F		1022	0716	1.4E		0548	0829	1.5E		0926	0926	1.6E
	1547	1249	1.9F		1507	1746	1.8E		1652	1357	1.7F		1136	1506	1.7F		1226	1556	1.9F
	2147	1838	1.6E		2059				1652	1939	1.5E		1800	2045	1.6E		1844	2147	1.7E
									2250				2354						
2 Sa	0419	0123	1.8F	17 Su	0341	0015	1.9F	2 Tu	0532	0231	1.8F	17 W	0539	0232	1.9F	2 F	0637	0424	2.2F
	1007	0704	1.4E		0817	0617	1.7E		0815	0815	1.4E		0823	0823	1.5E		0723	1024	1.7E
	1619	1345	1.8F		0928	1243	1.9F		1118	1452	1.7F		1130	1503	1.7F		1321	1650	2.0F
	2241	1933	1.6E		1605	1846	1.8E		1744	2033	1.8E		1755	2047	1.6E		1939	2242	1.8E
					2201				2343				2357						
3 Su	0515	0218	1.9F	18 M	0446	0125	1.9F	3 W	0624	0323	1.9F	18 Th	0643	0340	2.1F	3 Sa	0043	0514	2.3F
	1103	0802	1.4E		1032	0721	1.6E		1212	0909	1.4E		0934	0934	1.5E		0812	1112	1.8E
	1731	1439	1.8F		1708	1354	1.8F		1834	1543	1.7E		1237	1608	1.8F		1409	1737	2.1F
	2333		1.6E		2305				1834	2124	1.8E		1856	2154	1.7E		2026	2329	1.8E
4 M	0608	0311	1.9F	19 Tu	0551	0238	2.0F	4 Th	0713	0411	2.0F	19 F	0741	0440	2.2F	4 Su	0127	0600	2.3F
	1156	0857	1.4E		1139	0829	1.6E		1301	0958	1.5E		1036	1036	1.8E		0856	1153	1.8E
	1820	1530	1.8F		1807	1506	1.8F		1921	1629	1.8F		1335	1704	1.9F		1452	1820	2.2F
			1.6E		1807	2054	1.7E		1921	2209	1.7E		1952	2252	1.8E		2113		
5 Tu	0022	0400	2.0F	20 W	0008	0346	2.1F	5 F	0117	0454	2.1F	20 Sa	0155	0532	2.3F	5 M	0209	0009	1.8E
	0659	0947	1.5E		0854	0937	1.6E		0758	1041	1.6E		0833	1128	1.7E		0848	0641	2.2F
	1247	1616	1.8F		1244	1612	1.8F		1346	1710	1.8E		1427	1754	2.0F		1434	1230	1.8E
	1907	2200	1.7E		1906	2157	1.8E		2004	2251	1.8E		2043	2342	1.9E		2058	1900	2.1F
																	2155		
6 W	0107	0445	2.1F	21 Th	0108	0447	2.2F	6 Sa	0159	0532	2.2F	21 Su	0244	0620	2.3F	6 Tu	0251	0046	1.8E
	0746	1032	1.5E		0753	1040	1.6E		0839	1120	1.7E		0920	1214	1.8E		0926	0718	2.1F
	1333	1701	1.8F		1344	1711	1.9F		1427	1746	1.9F		1513	1840	2.1F		1513	1303	1.8E
	1951	2242	1.7E		2002	2256	1.8E		2045	2330	1.9E		2131				1607	1936	2.1F
																	2235		
7 Th	0149	0528	2.1F	22 F	0204	0543	2.3F	7 Su	0239	0608	2.3F	22 M	0330	0026	1.9E	7 W	0332	0121	1.8E
	0829	1113	1.6E		0847	1136	1.7E		0919	1158	1.9E		1003	0703	2.3F		1006	0427	2.0F
	1416	1741	1.8F		1439	1805	1.9F		1506	1820	2.0F		1033	1254	1.8E		1052	1336	1.8E
	2033	2320	1.8E		2055	2349	1.9E		2126				1556	1922	2.1F		1554	2011	2.0F
													2215				2316		
8 F	0229	0603	2.2F	23 Sa	0256	0633	2.3F	8 M	0318	0009	2.0E	23 Tu	0412	0107	1.8E	8 Th	0415	0156	1.7E
	0910	1151	1.7E		0937	1227	1.8E		0958	0640	2.3F		1044	0744	2.2F		0727	0827	1.9F
	1457	1816	1.8F		1529	1854	2.0F		1544	1236	2.0E		1636	1332	1.8E		1049	1411	1.7E
	2113	2358	1.9E		2145				2208	1854	2.1F		1636	2002	2.0F		1637	2046	2.0F
													2259				2358		
9 Sa	0307	0637	2.2F	24 Su	0345	0038	1.9E	9 Tu	0358	0049	2.1E	24 W	0452	0146	1.8E	9 F	0501	0234	1.7E
	0950	1228	1.8E		1025	0721	2.3F		1038	0715	2.4F		1124	0822	2.1F		0811	0902	1.8F
	1535	1849	1.9F		1617	1313	1.8E		1623	1316	2.1E		1715	1408	1.8E		1134	1450	1.7E
	2153				2234				2249	1932	2.2F		1756	2041	2.0F		1724	2125	1.9F
													2342						
10 Su	0345	0036	1.9E	25 M	0431	0124	1.9E	10 W	0440	0132	2.2E	25 Th	0533	0224	1.7E	10 Sa	0002	0317	1.6E
	1029	0710	2.3F		1110	0806	2.3F		1119	0754	2.4F		1205	0900	2.0F		0551	0943	1.7F
	1613	1305	1.8E		1702	1357	1.8E		1705	1356	2.1E		1205	1446	1.7E		1224	1534	1.6E
	2233		1.9F		2321				2334		2.2F		1756	2121	1.9F		1815	2209	1.8F
11 M	0424	0115	2.0E	26 Tu	0517	0209	1.8E	11 Th	0524	0217	2.2E	26 F	0607	0306	1.9E	11 Su	0058	0404	1.5E
	1108	0744	2.3F		1155	0850	2.2F		1203	0836	2.3F		0615	0939	1.9F		0646	1031	1.6F
	1653	1344	1.9E		1748	1439	1.8E		1750	1443	2.1E		1248	1527	1.7E		1320	1622	1.6E
	2315		2.0F		1748	2111	1.9F		1750	2059	2.2F		1839	2204	1.9F		1911	2301	1.8F
12 Tu	0504	0157	2.0E	27 W	0602	0253	1.8E	12 F	0612	0305	2.1E	27 Sa	0700	0351	1.8E	12 M	0748	0456	1.4E
	1149	0822	2.3F		1239	0934	2.1F		1251	0923	2.2F		1334	1024	1.8F		1421	1126	1.5F
	1734	1426	2.0E		1832	1522	1.7E		1839	1531	2.1E		1925	1612	1.8E		1637	1715	1.5E
	2359		2.0F		1832	2157	1.9F			2150	2.2F			2253	1.6E		2015	2359	1.8F
13 W	0548	0242	2.1E	28 Th	0648	0340	1.7E	13 Sa	0705	0357	2.0E	28 Su	0750	0440	1.5E	13 Tu	0857	0552	1.4E
	1233	0904	2.3F		1326	1019	2.0F		1343	1016	2.1F		1424	1114	1.7F		1528	1227	1.5F
	1819	1511	2.0F		1919	1608	1.7E		1934	1624	1.9E		2016	1702	1.5E		1528	1812	1.5E
		1819	2.0F			1919	1.8F			2248	2.1F			2348	1.7F		2125		
14 Th	0636	0330	2.0E	29 F	0737	0428	1.8E	14 Su	0804	0454	1.8E	29 M	0845	0534	1.4E	14 W	0917	0650	1.4E
	1320	0950	2.2F		1414	1109	1.8F		1442	1117	1.9F		1516	1212	1.6F		1010	0650	1.5E
	1908	1559	2.0F		2009	1656	1.6E		2035	1722	1.8F		2111	1757	1.5E		1637	1328	1.6E
		1908	2.0F			2009	1.8F			2358	1.9F						2237	1910	1.5E
15 F																			

# Pollock Rip Channel, Massachusetts, 1994

F—Flood, Dir. 035° True E—Ebb, Dir. 225° True

October						November						December																													
Slack			Maximum			Slack			Maximum			Slack			Maximum			Slack			Maximum																				
	h	m	h	m	knets		h	m	h	m	knets		h	m	h	m	knets		h	m	h	m	knets																		
1 Sa	0559	0839	1.8E	1150	1514	1.8F	1815	2057	1.7E	16 Su	0026	0402	2.2F	0858	1001	1.7E	1259	1628	2.1F	1920	2223	1.7E	16 F	0153	0522	1.9F	0809	1106	1.7E	1409	1746	2.2F	2048	2336	1.6E						
2 Su	0006	0336	2.1F	0846	0927	1.8E	1236	1558	2.0F	1903	2145	1.9E	17 M	0119	0451	2.2F	0745	1048	1.8E	1346	1715	2.2F	2008	2308	1.8E	2 W	0109	0427	2.2F	0740	1023	2.1E	1333	1652	2.3F	2009	2249	2.1E			
3 M	0053	0419	2.2F	0730	1011	1.9E	1320	1839	2.1F	1948	2230	2.0E	18 Tu	0205	0535	2.2F	0828	1128	1.8E	1427	1757	2.2F	2052	2348	1.8E	3 Th	0158	0512	2.2F	0825	1109	2.2E	1419	1738	2.4F	2057	2337	2.1E			
4 Tu	0139	0459	2.3F	0812	1054	2.1E	1402	1719	2.3F	2032	2314	2.1E	19 W	0247	0615	2.1F	0908	1203	1.8E	1504	1836	2.2F	2133			4 F	0248	0558	2.2F	0911	1156	2.2E	1505	1824	2.5F	2148					
5 W	0223	0539	2.3F	0854	1136	2.2E	1444	1759	2.4F	2117	2359	2.2E	20 Th	0325	0652	2.0F	0945	1234	1.8E	1539	1911	2.1F	2212			5 Sa	0336	0645	2.2F	0959	1244	2.2E	1554	1913	2.5F	2237					
6 Th	0308	0620	2.4F	0937	1219	2.3E	1527	1842	2.5F	2203			21 F	0401	0725	1.9F	1022	1306	1.8E	1614	1944	2.1F	2251			6 Su	0427	0738	2.1F	1050	1334	2.1E	1644	2006	2.4F	2331					
7 F	0354	0703	2.3F	1022	1305	2.3E	1613	1928	2.5F	2252			22 Sa	0438	0757	1.8F	1100	1340	1.8E	1650	2017	2.0F	2332			7 M	0521	0831	2.0F	1144	1427	2.0E	1739	2104	2.3F						
8 Sa	0442	0750	2.2E	1110	1353	2.2E	1701	2016	2.4F	2345			23 Su	0516	0831	1.8F	1140	1419	1.7E	1728	2053	2.0F				8 Tu	0028	0306	1.8E	0619	0933	1.9F	1242	1525	1.9E	1837	2209	2.2F			
9 Su	0534	0842	2.1F	1202	1444	2.1E	1754	2114	2.3F				24 M	0015	0248	1.8E	0558	0909	1.7F	1223	1501	1.7E	1810	2134	1.9F	9 W	0129	0408	1.7E	0722	1043	1.7F	1346	1629	1.7E	1941	2320	2.0F			
10 M	0632	0942	1.9F	1300	1541	1.9E	1853	2219	2.1F				25 Tu	0100	0333	1.8E	0644	0954	1.6F	1311	1548	1.6E	1857	2220	1.9F	10 Th	0231	0516	1.6E	0828	1157	1.7F	1452	1739	1.6E	2048					
11 Tu	0736	1053	1.7F	1404	1645	1.7E	1958	2335	2.0F				26 W	0150	0422	1.5E	0734	1045	1.6F	1402	1639	1.6E	1947	2313	1.8F	11 F	0335	0627	1.5E	0935	1308	1.8F	1559	1852	1.5E	2155					
12 W	0251	0531	1.5E	0845	1214	1.7F	1512	1757	1.8E	2109			27 Th	0242	0515	1.5E	0828	1141	1.6F	1457	1733	1.5E	2042			12 Sa	0437	0736	1.8E	1039	1412	1.9F	1703	2002	1.5E	2300					
13 Th	0359	0649	1.5E	0957	1331	1.7F	1621	1915	1.5E	2220			28 F	0335	0610	1.5E	0923	1240	1.6F	1553	1829	1.5E	2138			13 Su	0534	0838	1.6E	1138	1510	2.0F	1802	2103	1.6E	2358					
14 F	0505	0803	1.5E	1106	1438	1.8F	1727	2028	1.6E	2327			29 Sa	0428	0705	1.9F	1018	1338	1.7F	1648	1925	1.6E	2234			14 M	0627	0931	1.7E	1230	1601	2.1F	1856	2156	1.6E						
15 Sa	0604	0907	1.6E	1206	1536	2.0F	1827	2130	1.7E				30 Su	0519	0758	1.7E	1110	1431	1.8F	1741	2019	1.7E	2328			15 Tu	0051	0423	2.1F	0714	1018	1.8E	1317	1649	2.2F	1945	2243	1.7E			
													31 M	0608	0849	1.8E	1200	1520	2.0F	1831	2111	1.8E																			

Time meridian 75° W. 0000 is midnight. 1200 is noon.

TABLE 2 - CURRENT DIFFERENCES AND OTHER CONSTANTS

No.	PLACE	Meter Depth	POSITION		TIME DIFFERENCES				SPEED RATIOS		AVERAGE SPEEDS AND DIRECTIONS							
			Latitude	Longitude	Min. before Flood	Flood	Min. before Ebb	Ebb	Flood	Ebb	Minimum before Flood		Maximum Flood		Minimum before Ebb		Maximum Ebb	
											knots	Dir.	knots	Dir.	knots	Dir.	knots	Dir.
	BUZZARDS BAY <7>-cont. Time meridian, 75° W	ft	North	West	h m	h m	h m	h m										
					on Pollock Rip Channel, p.20													
2058	Penikese Island, 0.2 mile south of		41° 28.6'	70° 55.5'	-1 43	-0 15	-1 30	-2 39	0.4	0.5	0.0	--	0.7	093°	0.0	--	0.9	287°
2061	Gull I. and Nashawena I., between		41° 28.2'	70° 54.2'	-2 15	-0 57	-2 01	-2 41	0.5	0.6	0.0	--	0.9	091°	0.0	--	1.1	247°
2068	Weepectet Island, south of		41° 30.4'	70° 44.3'	-3 18	-1 07	-1 28	-2 27	0.4	0.4	0.0	--	0.8	069°	0.0	--	0.8	255°
2071	Quamisset Harbor entrance		41° 32.4'	70° 39.8'	Current weak and variable						0.0	--	0.4	--	0.0	--	0.3	--
2078	West Falmouth Harbor entrance		41° 36.5'	70° 39.3'	Current weak and variable													
2081	Megansett Harbor		41° 38.8'	70° 39.2'	Current weak and variable													
2086	Abiels Ledge, 0.4 mile south of		41° 41.1'	70° 40.4'	+0 28	-0 38	-0 08	-0 23	0.4	0.6	0.0	--	0.8	035°	0.0	--	1.0	216°
2091	Dumping Rocks, 0.2 mile southeast of		41° 32.0'	70° 55.1'	-1 43	-1 03	-1 32	-2 09	0.4	0.6	0.0	--	0.8	066°	0.0	--	1.1	190°
2098	Apponaganset Bay		41° 35'	70° 57'	Current weak and variable													
2101	Clarks Cove		41° 38'	70° 55'	Current weak and variable													
2108	New Bedford Harbor and approaches				Current weak and variable													
2111	West Island and Long Island, between		41° 35.8'	70° 50.4'	Current weak and variable						0.0	--	0.3	--	0.0	--	0.4	--
2116	West Island, 1 mile southeast of	6	41° 34.0'	70° 48.6'	-0 43	-0 43	-1 28	-1 42	0.4	0.5	0.0	--	0.7	079°	0.0	--	0.8	203°
2121	Nasketucket Bay		41° 37.1'	70° 50.2'	Current weak and variable						0.0	--	0.3	--	0.0	--	0.3	--
2128	Mattapoisett Harbor		41° 38'	70° 47'	Current weak and variable													
2131	Sippican Harbor		41° 41'	70° 44'	Current weak and variable						0.0	--	0.3	--	0.0	--	0.4	--
2138	Wareham River, off Long Beach Point		41° 44.0'	70° 43.0'	-1 41	-0 31	-1 22	-1 23	0.3	0.4	0.0	--	0.6	022°	0.0	--	0.8	202°
2141	Wareham River, off Barney's Point		41° 44.7'	70° 42.4'	-1 49	-0 27	-1 22	-1 31	0.4	0.4	0.0	--	0.7	010°	0.0	--	0.6	185°
					on Cape Cod Canal, p.16													
2148	Onset Bay, south of Onset Island		41° 43.9'	70° 38.7'	Current weak and variable													
2151	Onset Bay, south of Wickets Island		41° 44.1'	70° 39.3'	Current weak and variable													
	CAPE COD CANAL																	
2158	CAPE COD CANAL, railroad bridge		41° 44.5'	70° 38.6'	Daily predictions						0.0	--	4.0	070°	0.0	--	4.5	250°
2161	Bourne Highway bridge		41° 45'	70° 35'	-0 03	-0 01	-0 03	-0 04	0.8	0.9	0.0	--	3.3	065°	0.0	--	4.0	245°
2168	Bourneale		41° 48'	70° 34'	-0 07	-0 03	-0 09	-0 10	0.8	0.8	0.0	--	3.4	030°	0.0	--	3.6	210°
2171	Sagamore Bridge		41° 46'	70° 33'	-0 09	-0 04	-0 11	-0 13	0.7	0.6	0.0	--	2.8	095°	0.0	--	2.5	275°
2178	Cape Cod Canal, east end	15	41° 46.5'	70° 30.0'	-0 13	-0 06	-0 17	-0 19	0.6	0.6	0.0	--	2.4	065°	0.0	--	2.6	245°
	NARRAGANSETT BAY <8>																	
					on Pollock Rip Channel, p.20													
2181	Sakonnet River (except Narrows)				Current weak and variable													
2186	Black Point, SW of, Sakonnet River	15	41° 30.4'	71° 13.2'	-2 54	-1 55	-2 13	-2 28	0.2	0.2	0.0	--	0.4	012°	0.0	--	0.4	194°
2191	Almy Point Bridge, south of, Sakonnet River	15	41° 37.3'	71° 13.2'	-3 00	-2 10	-2 30	-3 13	0.2	0.8	0.0	--	0.4	034°	0.0	--	1.5	180°
2196	Tiverton, Stone bridge, Sakonnet R. <9>		41° 37.5'	71° 13.0'	-2 58	-5 02	-2 26	-3 06	1.4	1.6	0.0	--	2.7	010°	0.0	--	2.7	190°
						-2 54			0.3				0.6	010°				
						-0 36			1.3				2.5	010°				
2201	Tiverton, RR. bridge, Sakonnet R. <10>		41° 38.3'	71° 12.9'	-3 28	-5 08	-2 48	-3 41	1.2	1.4	0.0	--	2.3	000°	0.0	--	2.4	180°
						-3 04			--				--					
						-1 15			0.8				1.5	000°				
2206	Common Fence Point, northeast of	10	41° 39.5'	71° 12.5'	-2 38	-4 50	-2 32	-2 41	0.1	0.2	0.0	--	0.2	026°	0.0	--	0.3	210°
						-2 25			0.0				0.1	058°				
						-0 58			0.1				0.1	046°				
2211	Brenton Point, 1.4 n.mi. southwest of	7	41° 25.9'	71° 22.6'	-1 03	-0 38	-1 20	-1 04	0.2	0.4	0.0	--	0.4	347°	0.0	--	0.6	170°
2218	Castle Hill, west of, East Passage	15	41° 27.4'	71° 22.7'	-0 08	-0 42	-1 07	-0 29	0.4	0.7	0.0	--	0.7	013°	0.0	--	1.2	237°
2221	Bull Point, east of	10	41° 28.8'	71° 21.0'	-1 10	-0 47	-1 10	-1 33	0.6	0.8	0.0	--	1.2	001°	0.0	--	1.5	206°
2226	Mackerel Cove		41° 28.5'	71° 22.8'	Current weak and variable													
2231	Newport Harbor, S and E of Goat Island		41° 29'	71° 20'	Current weak and variable													
2236	Rose Island, northeast of	15	41° 30.2'	71° 19.9'	-1 57	-0 07	-1 17	-2 08	0.4	0.5	0.0	--	0.8	310°	0.0	--	1.0	124°
2241	Rose Island, northwest of	15	41° 30.4'	71° 21.1'	-1 38	-0 26	-1 38	-1 39	0.4	0.5	0.1	105°	0.7	007°	0.1	102°	1.0	190°
2246	Rose Island, west of		41° 29.8'	71° 21.0'	-0 42	-0 34	-1 20	-1 28	0.4	0.6	0.0	--	0.7	001°	0.0	--	1.0	172°
2251	Gould Island, southeast of	7	41° 31.5'	71° 20.2'	-1 40	-1 28	-1 14	-1 16	0.3	0.4	0.0	--	0.5	033°	0.0	--	0.7	217°
2258	Gould Island, west of	15	41° 31.9'	71° 21.5'	-0 16	-0 32	-1 13	-1 07	0.3	0.4	0.0	--	0.6	351°	0.1	279°	0.8	193°

Endnotes can be found at the end of table 2.

ORDNANCE AND EXPLOSIVE WASTE  
ARCHIVES SEARCH REPORT  
FOR  
FORMER BUTLER POINT AMTB BATTERY  
MARION, MASSACHUSETTS  
PROJECT NUMBER D01MA050601

APPENDIX F

LETTERS/MEMORANDUMS/MISCELLANEOUS ITEMS

APPENDIX F  
LETTERS/MEMORANDUMS/MISCELLANEOUS ITEMS

Table of Contents

- F-1. War Department memo authorizing AMTB batteries (B-31).
- F-2. Harbor defense report (B-30).
- F-3. General characteristics of the 90mm battery (B-29).
- F-4. Record of practice firing for Fort Getty (B-7).



**SECRET**The Adjutant General's Office  
Washington

COPY NO. 13

AG 661.2 (10-16-42)CB-S-E-M

16962

SEE/evl-2E-639 Pentagon

October 24, 1942.

SUBJECT: Defense of Harbors Against Motor Torpedo Boats.

TO: Commanding Generals,  
 Caribbean Defense Command;  
 Hawaiian Department;  
 U.S. Army Forces in Iceland;  
 Newfoundland Base Command (THRU: C.G.,  
 Eastern Defense Command).  
 Commanding Officers,  
 Greenland Base Command;  
 Bermuda Base Command (THRU: C.G.,  
 Eastern Defense Command).

.....  
 : **SECRET** :  
 :Auth: T.A.G. :  
 :Initials: *alp* :  
 :Date: 10-24-42 :  
 :.....

1. Reference is made to letter of October 7, 1942, SPX 452.5 (10-6-42) OB-S-SPDEO-M, subject: Distribution of Anti-Motor Torpedo Boat Weapons.

2. It is desired that you take the necessary action to establish a defense by fire of 37-mm and 90-mm guns against motor torpedo boats in the harbors under your command. Subject to the limits on the total number of batteries, as given in reference cited in Paragraph 1, above, you are authorized to approve the sites and to direct the necessary construction as emergent projects, charging the costs thereof to the currently authorized FDGA procurement authority for your command.

3. You will prescribe the mission of the anti-motor torpedo boat armament in each harbor defense and the priorities of vital areas to be defended, taking into consideration the personnel and weapons available. Where practicable without detriment to the effectiveness of the anti-motor torpedo boat defense, the armament will be sited to permit employment as antiaircraft artillery, particularly for defense against low flying torpedo or mine laying planes.

4. You are authorized to change the armament allotments for any of the harbor defenses listed in letter cited in Paragraph 1, above, provided there is no increase in the total of any item for your command as a whole. No additional armament or fire control equipment can be made available at this time. Any changes in allotments to harbor defenses will be reported by air mail letter or radiogram to the Commanding General, Services of Supply, giving the new shipping destinations and amounts approved by you together with a statement of the shipping destination and amounts to be cancelled.

5. In selecting sites every effort that is consistent with accomplishment of the tactical mission will be made to economize on the time required for construction of positions and installation of armament. The use of sites already provided with means of access and signal communications, sites already owned by

DECLASSIFIED

DDO Dir. 52808, Sept. 27, 1958

RCWN by *[signature]* date 5-21-70**SECRET**

F-1

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AG 660.2 (10-16-42)03-S-I-M

(Cont'd.)

October 24, 1942.

the government, and localities convenient to existing housing is a means to this end. Fortifications construction at sites will be limited to the minimum essentials and in general will conform to that normally provided for mobile antiaircraft batteries rather than the heavily protected type that is standard for fixed seacoast batteries. Development of special fire control equipment for 90-mm fixed antiaircraft batteries and of a fixed mount for the 40-mm automatic gun is in process. Until the outcome of these developments is apparent, permanent construction at sites will be limited to the gun blocks for 90-mm fixed mounts. For other facilities, earth and timber or other non-critical materials will be used. Security will be obtained by concealment rather than by material cover.

6. Personnel to man anti-motor torpedo boat armament will be provided by defense commanders from current authorized strength.

7. Searchlights are highly effective as a deterrent against motor torpedo boat operations at night, since they dazzle the pilots and obscure the landmarks essential for navigation. No additional searchlights are being provided at this time. The illuminating and searching lights necessary for employment with the anti-motor torpedo boat armament will be provided by defense commanders on a temporary basis by relocating portable seacoast or antiaircraft searchlights already on hand in harbor defense or supporting units. A special type of searchlight intended to give a wide beam is under development, but the distribution cannot be forecast at this time.

8. Attention is invited to the minimum range limit of 3250 yards for the antiaircraft Director M7 which prevents director control of 90-mm gun fire at less than that distance. Owing to the maneuverability of the motor torpedo boat, it is estimated that the maximum effective range of the 90-mm gun will be 8000 yards, corresponding to a time of flight of 15 seconds. Where there are vulnerable areas inside the 3250-yard minimum range, sites will be selected so as to insure that the dead areas of 90-mm batteries are covered by adjacent 90-mm batteries, 37-mm batteries, or existing 3-inch fixed batteries.

9. The necessary construction drawings pertaining to fixed gun blocks for 90-mm antiaircraft guns will be furnished to district engineers and defense commanders by separate communications. Average cost of these gun blocks, it is estimated, will be about \$5,000 each in the continental United States.

10. Submission of detailed formal projects for installation of armament is not required at this time. It is desired that for each harbor defense a separate report on the defense against motor torpedo boats, with suitable maps or charts, be submitted to the Chief of Staff in quadruplicate within 20 days after receipt of this directive. This report will include:

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AG 660.2 (10-16-42)OE-S-E-M

(Cont'd.)

October 24, 1942.

a. Tabulation showing site, directrix, and number of guns for each 90-mm and 37-mm battery approved by you.

b. Tabulation showing site, directrix, and number of guns for each 3-inch seacoast battery, either established under the provisions of the directive cited in Paragraph 1 a, above, or retained from previous projects.

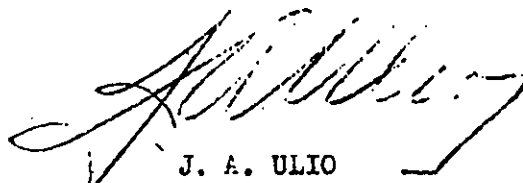
c. Mission assigned to anti-motor torpedo boat armament in each harbor defense and designation of vital areas to be given priority in defense.

d. Map or chart showing for each harbor defense arcs of fire and dead spaces for anti-motor torpedo boat armament.

e. Maps or charts on scale not over 1/80,000 showing for each harbor defense the location of each anti-motor torpedo boat battery.

f. Map or chart 1/80,000 showing plan for searchlight illumination for defense against motor torpedo boats.

By order of the Secretary of War:

  
J. A. ULLO  
Major General,  
The Adjutant General.

Copies Furnished:

Commanding General, Services of Supply.

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Par. 1 - REFERENCE TO BASIC PROJECT: The Basic Project for the Harbor Defenses of New Bedford is set up by the War Department in the following authorities.

a. Annexes to Harbor Defense Project HDof New Bedford approved by the Secretary of War in the 20th Indorsement, AG 660.2 (11-16-33) (Misc.) E, dated June 9, 1934. These approved annexes constitute the basic project prior to revision by reference 1-b below.

b. Secret letter WD AGO AG 660.2 (9-11-40) M-WPD-M dated September 25, 1940, Subject: "Modernization of Harbor Defense Projects, Continental United States." establishes the amount and types of modern armament that constitute the Basic Project.

c. 2nd Indorsement, WD AGO AG 660.2 (8-30-42) MS-E dated July 27, 1942 to secret letter HQ MES 600.1 dated June 30, 1942, Subject: "Resiting Battery Construction #210, Harbor Defenses of New Bedford." moves Battery #210 from Fort Rodman to Mishaum Point.

d. Secret letter WD AGO AG 660.2 (2-4-42) MEC-E dated March 1, 1942, Subject: "Harbor Entrance Control Post, New Bedford, Mass." locates NECP at Mishaum Point.

e. Secret letter WD AGO AG 660.2 dated April 17, 1943, Subject: "Defense of Harbors against Motor Torpedo Boats." authorizes 4 90mm AMTB batteries.

Par. 2 - PURPOSE OF SUPPLEMENT: This supplement amplifies the Basic Project and is intended to furnish a concise record of the status both of existing Harbor Defense fortification construction and equipment, and of new or modified construction which has been approved by the War Department for future accomplishment. One of the principal purposes is to provide the basis for advance procurement of funds and materials necessary to complete approved items. A second important purpose is to make available, to those concerned, information of a technical and tactical nature which is not otherwise available in usable form.

Par. 3 - MISSION OF HARBOR DEFENSES:

a. To cover the left (East) flank of the Narragansett Bay Sub-area; in conjunction with the Harbor Defenses of Narragansett Bay to deny to the enemy the use of Buzzard's Bay and Vineyard Sound and to cover the debouchment of our fleet into the Atlantic Ocean.

b. To deny to the enemy access to Buzzard's Bay and New Bedford Harbor.

c. To protect friendly shipping and Harbor facilities in New Bedford from enemy naval gun fire.

d. To support the defense against landing attack.

Par. 4 - TACTICAL ORGANIZATION:

a. The tactical organization of this Harbor Defense consists of two groups and two separate batteries under the Harbor Defense Commander. (See Exhibit 1-A). Group one consists of the AMTB batteries located at Barney's Joy, Cuttyhunk Island, and Mashawena Island. These batteries are all in the same vicinity and their fields of fire are visible from the group station on Cuttyhunk Island. Group two consists of the 6" BC Battery 210 located at Mishaum Point and the 12" LR Battery Milliken located at Fort Rodman. These two batteries cover

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By	WMD	760162
	NAAS, U.S.	7-20-44

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approximately the same field of fire and are grouped by water areas rather than by armament. The AMTB Battery at Butlers Point, consisting of 4 90mm guns, is a separate battery under the Harbor Defense Commander, due to the isolated position. The AMTB Section at Juniper Point, consisting of 2 37mm guns, is also a separate section under the Harbor Defense Commander, due to the isolated position.

b. This Harbor Defense is in constant contact with the Navy through the HECF. The HECF furnishes Naval intelligence from the Naval Section Base at Woods Hole, the Coast Guard, and the Navy loops located at the entrance to Buzzards Bay. Responsibility for cooperative arrangements with the Air Corps is vested in higher echelons of command.

-4-

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Par. 5 - Armament - Continued

b.

BATTERIES AUTHORIZED FOR EXCLUSION FROM THE BASIC PROJECT

LOC NO.	NAME	LOCATION	NO & CAL OF GUNS	MODEL		STATUS OF MAGAZINES & EMPLOYMENT	REF NO.	PG. NO.
				GUNS	MOUNT			
53	Barton Walcott	Ft. Rodman	2-8" DC	1888 M2	1896 DC	Storage space		
This battery is being salvaged by authority of the Secretary of War per 2nd Ind. (Secret) AG 562 (11-6-42) OB-S-SPDO, dated December 15, 1942 to letter (Secret) Headquarters New England Sector, file 400.93 November 6, 1942, Subject: Disposal of Batteries. (Tubes removed and returned to arsenal. Carriages, tools, and accessories being sold to civilian contractor).								
53	Semi Mobile	Ft. Rodman	2 155mm	M1918 M1	M1917	Manned, at present.		
51	Semi Mobile	Mischaum Pt.	2 155mm	M1918 M1	M1918 A1	Manned, at present.		
56C	Semi Mobile	Butlers Pt.	2 155mm	M1918 M1	M1918 A1	Manned, at present.		
Authority: Secret letter WD AGO AG 560.2 (9-11-40) M-WFD-M dated September 25, 1940, Subject: Modernization of Harbor Defense Projects, Continental United States.								

WAR RESERVE AND BATTLE ALLOWANCE OF AMMUNITION

BATTERY OR CONSTRUCTION NO.	NO. OF GUNS	CALIBER AND TYPE	TYPE PROJ.	WAR RESERVE	BATTLE ALLOWANCE
Milliken	2	12" LR	AP 1070#	450 ✓	500 ✓
			HE MK4 700#		90 ✓
#210	2	6" BC	HE 90#	300 ✓	300 ✓
			AP 108#	300 ✓	400 ✓
<p>Authority: Letter January 18, 1943 AG 471 WD (1-10-43)            OB-S-SPDDO-M, Subject: War Reserve Ammunition Seacoast Artillery,            letter March 18, 1943 AG 471 WD (3-18-43) OB-SPDDO-M, Subject:            War Reserve Ammunition Seacoast Artillery.</p>					
<p>#931, 932, 933, 934 AMTB BATTERIES</p>					
<p>1. a. For each fixed AMTB 90mm gun, a mobilization allowance of 400 rounds with the M48 fuse and a day of supply of 0.5 round.</p>					
<p>b. For each AMTB 90mm gun (fixed and mobile), one unit of fire of 90mm ammunition, 90% with M43 fuse, and 10% with Shot AP.</p>					
<p>2. For each 37mm AMTB gun, the authorized antiaircraft ammunition allowance for the Eastern Defense Command applies.</p>					
<p>Authority: Letter April 17, 1943 WD AGO AG 660.2 (4-18-43)            OB-S-SPDDO-M, Subject: "Defense of Harbors against Motor Torpedo Boats", (Tab "B" Ammunition).</p>					
<p>Note: All ammunition is stored at battery site. Current storage regulations (TM 9-1900) are being complied with for war time conditions.</p>					

Par. 7

DEFENSE AGAINST MOTOR TORPEDO BOATS

TACTICAL NO.	LOC NO.	SITE NO.	NAME OR CONST. NO.	NO. OF GUNS	CAL OF GUNS	TYPE OF MOUNT	COMPLETION DATE	MISSION		EXHIBITS
								PRI	SEC	
AMTB #1	56A		#931	2	90mm	MS fixed	1943	AMTB AA		7A
				2	90mm	MLA1 mobile	1943	AMTB AA		7A
				2	57mm	MS or MSE1	1943	AMTB AA		7A
AMTB #2	57A		#932	2	90mm	MS fixed	1943	AMTB AA		7A
				2	90mm	MLA1 mobile	1943	AMTB AA		7A
				2	57mm	MS or MSE1	1943	AMTB AA		7A
AMTB #3	57B		#933	2	90mm	MS fixed	1943	AMTB AA		7A
				2	90mm	MLA1 mobile	1943	AMTB AA		7A
				2	57mm	MS or MSE1	1943	AMTB AA		7A
AMTB #4	56C		#934	2	90mm	MS fixed	1943	AMTB AA		7A
				2	90mm	MLA1 mobile	1943	AMTB AA		7A
AMTB #5	58B		#334	2	57mm	MS or MSE1	1943	AMTB AA		7A

FOR FIELDS OF FIRE, SEE EXHIBIT 7A,

Authority: Secret letter War Department Adjutant General's Office AG 600.2 (4-12-43) OB-S-SPDO-M, dated April 17, 1943, Subject: "Defense of Harbors against Motor Torpedo Boats."

Inclosure #1, Secret letter WD Services of Supply, file SHX 432.5 (10-6-42) OB-S-SPDO-M, dated October 7, 1942, Subject: Distribution of Anti-Motor Torpedo Boat Weapons.

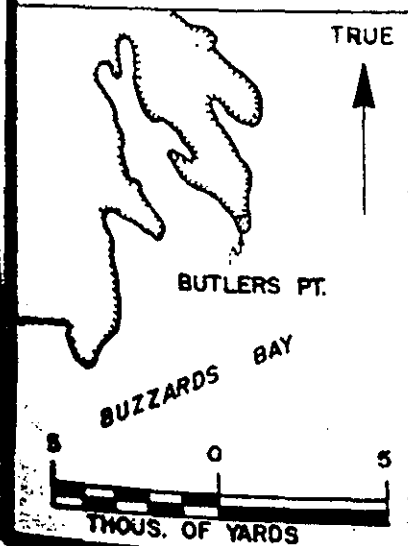
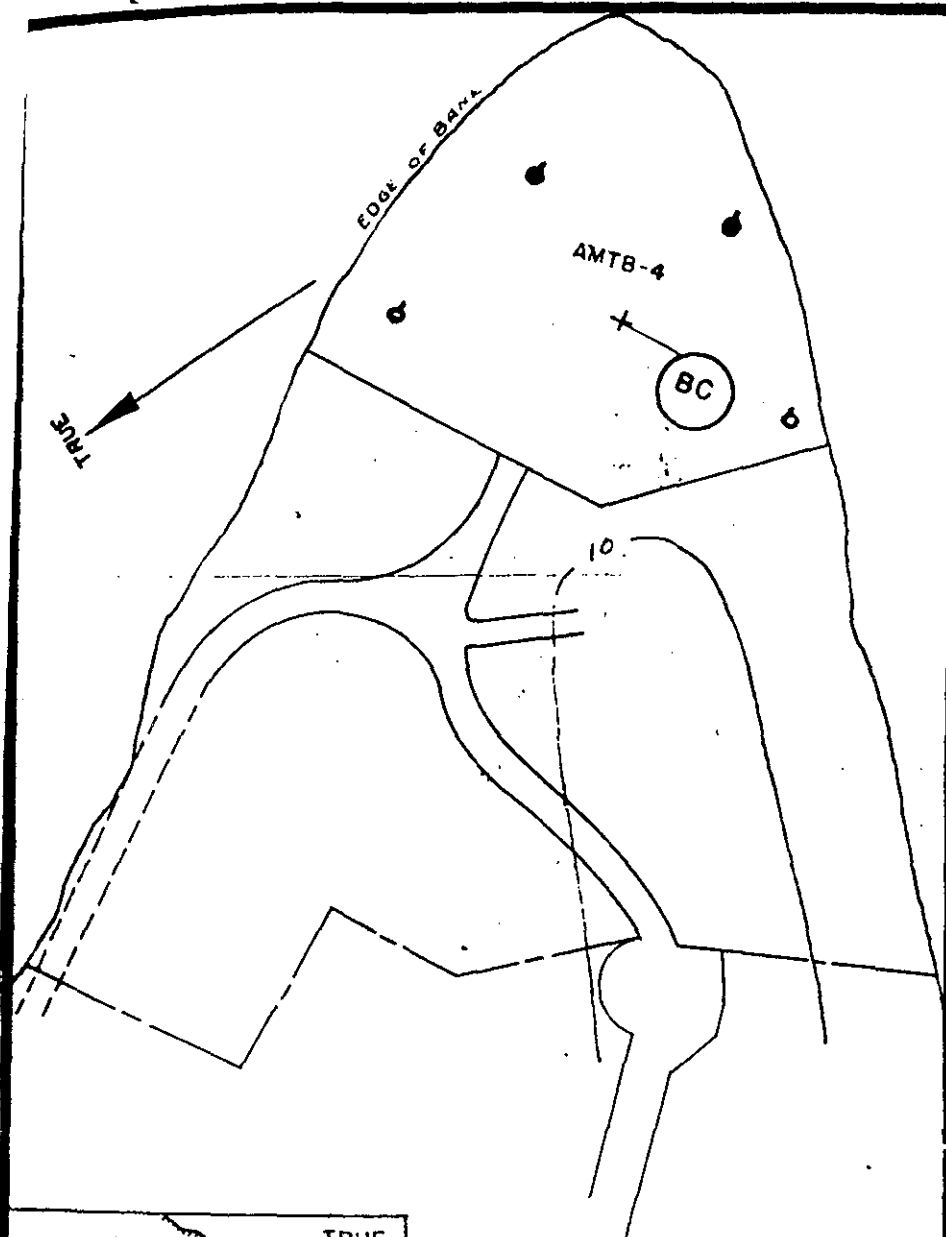
Secret letter WD AGO AG 660.2 (10-16-42) OB-S-E-M, dated October 24, 1942, Subject: Defense of Harbors against Motor Torpedo Boats.

Secret letter WD AGO AG 660.2 (2-12-42) MSC-E, dated February 21, 1942, Subject: Defense of Harbors against Motor Torpedo Boat Weapons.



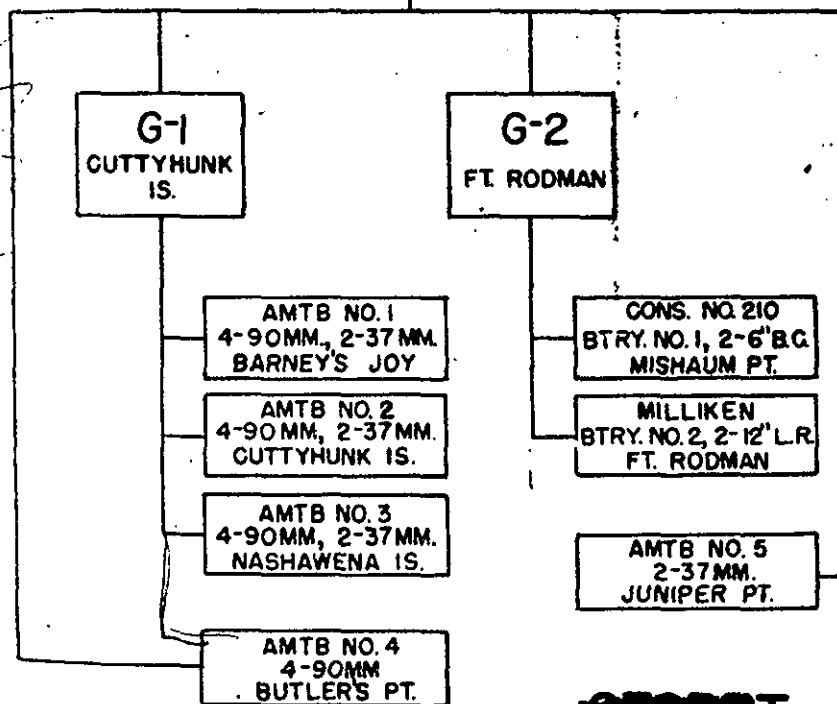
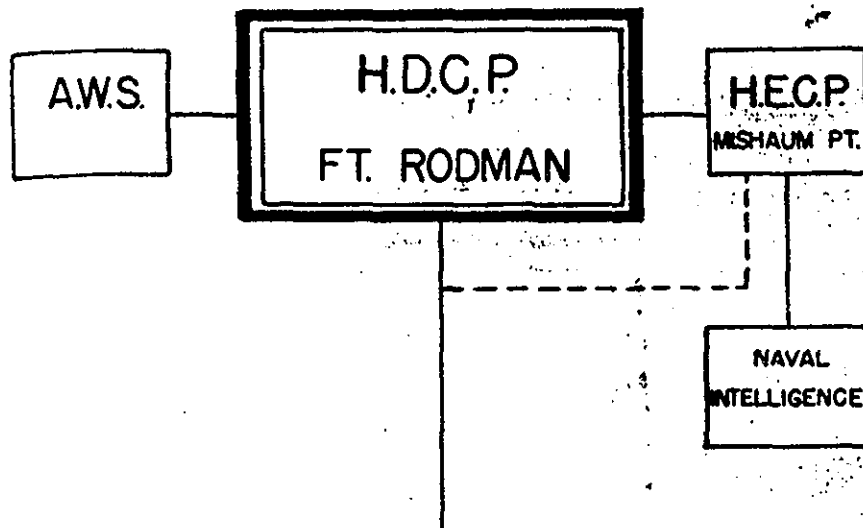
REF NO.	WAR DEPARTMENT AUTHORIZATION
1	<p>Gooseberry -- Leased</p> <p>2nd Ind. WD Office C of E, August 10, 1942 CE 601.53</p> <p>Subject: Contract with Nicholas Saliveros; letter Headquarters Newport Subsector dated December 9, 1941 Subject: Structure and Terrain needed by Newport Subsector.</p>
2	<p>Barney's Joy -- Leased</p> <p>2nd Ind., EDC, 601.3300, dated December 19, 1942,</p> <p>Subject: Acquisition of Land Barney's Joy.</p>
3	<p>Mishaum Point -- Acquired</p> <p>2nd Ind., Under Secretary of War, dated August 13, 1942, CE 601.1, Subject: Acquisition of Land Mishaum Point.</p>
4	<p>Round Hill -- Declaration of Taking</p> <p>2nd Ind., Under Secretary of War, dated November 3, 1941, CE 601.1, Subject: Acquisition of Land Round Hill.</p>
5	<p>Fort Rodman -- Acquired (See Military Reservations Massachusetts, War Department, Washington, September 9, 1941).</p>
SUMMARY OF ACQUISITION	
<p>a. Deed from Francis Allen, dated June 2, 1800, conveying 141 rods of upland (lighthouse site) for the sum of \$50.00, paid to him by the inhabitants of the town of New Bedford. Recorded in book 79, north district, land records of Bristol County, page 132.</p>	
<p>b. Deed from Butlet H. Bixby, dated September 24, 1857, conveying 60.00 acres of land by metes and bounds, exclusive of the lighthouse tract and certain roads included therein for the sum of \$78,000.00. Recorded in book 34, south district, land records of Bristol County, pages 431, 432, 433 thereof.</p>	
<p>c. Ordinance of City of New Bedford authorizing mayor and others to bind the city in the matter of an agreement with the United States in regard to roads, dated March 31, 1859.</p>	
<p>d. Deed of release from E. W. Howland, dated June 10, 1859, conveying all interest in all the roads at Clark's Point subject to the conditions of an agreement between the special board of engineers and the city of New Bedford. Recorded in liber 40, folio 232 of same records. Consideration involved \$5.00.</p>	
<p>e. By an agreement between the United States and the city of New Bedford, dated June 10, 1859, certain roads on the reservation were to be closed and a new road constructed and, pursuant to this agreement, a new road has been constructed across the northerly side of the reservation, and the city of New Bedford possesses an easement for roadway or street purposes in said new road.</p>	
6	<p>West Island -- Acquired</p> <p>2nd Ind., Under Secretary of War dated August 18, 1941, CE 601.1, Subject: Acquisition of land West Island.</p>

REF NO.	WAR DEPARTMENT AUTHORIZATION
7	<p>Pease Point -- Leased Letter WD Corps of Engineers Office of Division Engineer New England Division 601.53 (Mattapoisett Mass) DRE4, dated July 14, 1942 Subject: Lease and Condition Report on Elbert G. Allen et ux property.</p>
8	<p>Butlers Point -- Leased 2nd Ind., Headquarters EDC and First Army, November 22, 1942, 601.53/794GD letter Headquarters New England Sector, dated November 17, 1942 Subject: Lease of Kittansett Golf Club, Marion, Mass.</p>
9	<p>Cuttyhunk - Par. 1 &amp; 2 -- Acquired 2nd Ind., Under Secretary of War 601.1, dated August 27, 1941, Letter, Corps of Engineers, Subject: Land Acquisition Cuttyhunk Island.</p>
10	<p>Cuttyhunk - Par. 4 -- Acquired 2nd Ind., Under Secretary of War 601.1, dated November 6, 1942, Letter, Corps of Engineers, Subject: Land Acquisition Cuttyhunk Island.</p>
11	<p>Cuttyhunk - Par. 3, 5 &amp; 6 -- Leased 2nd Ind., Headquarters EDC and First Army, 601.53, dated December 19, 1942, Letter Subject: Acquisition of Land Cuttyhunk Island.</p>
12	<p>Nashawena Island -- Leased Letter, Harbor Defenses of New Bedford, dated December 18, 1942, 601.53, Subject: Lease of land Nashawena Island.</p>
13	<p>Letter WD Office of the Chief of Engineers dated September 28, 1942 CE 601.53 (General) - SPELS Subject: Delegation of Authority to Division Engineers for the Purpose of Decentralizing and Expediting Acquisition of Leaseholds</p>
14	<p>Naushon -- Leased Letter WD Office of the Division Engineer New England Division, dated January 5, 1943 Subject: Transmittal of lease with L. Cameron Forbes et als Trustees of Naushon Trust.</p>
15	<p>Juniper Point -- Leased 2nd Ind., Headquarters EDC and First Army, 601.53OD, dated December 18, 1942, Subject: Acquisition of Land Juniper Point.</p>
Par. 10 --	<p><u>LAND ACQUISITION</u>  None required.</p>



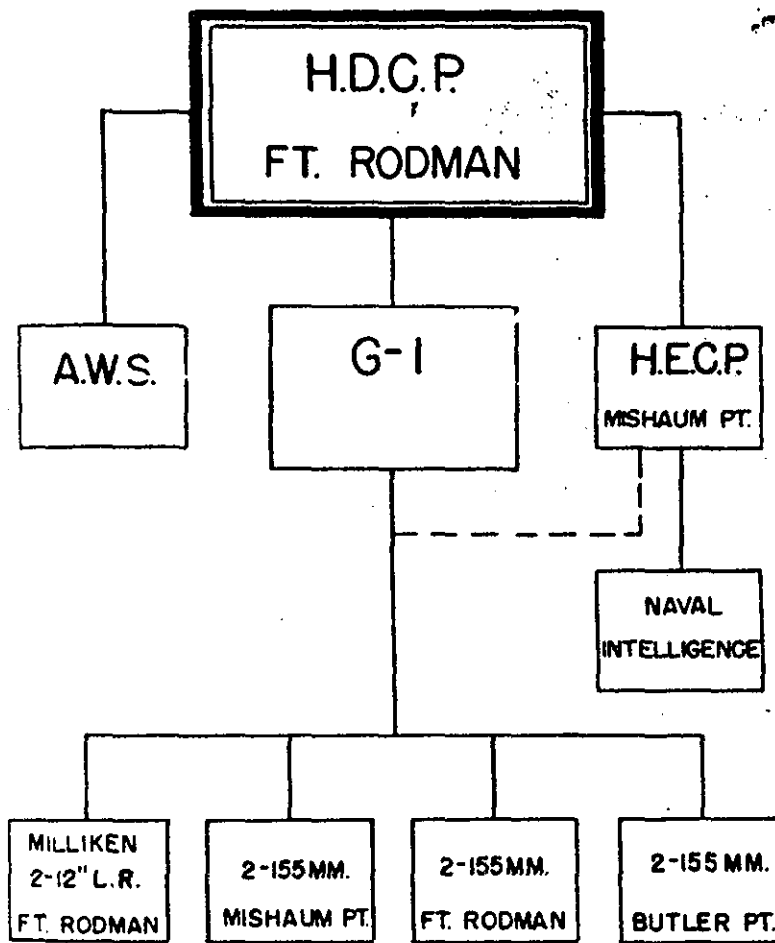
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H.D. OF NEW BEDFORD FIRE CONTROL INSTALLATIONS BUTLERS POINT LOC. 56C		REV'S'D DATE
PREPARED BY HARBOR DEFENSES OF NEW BEDFORD	DATE 7-1-43 EX. NO. 9-B-7	



**SECRET**

H.D. OF NEW BEDFORD		REVISED DATE
<b>TACTICAL ORGANIZATION</b>		
PREPARED BY HARBOR DEFENSES OF NEW BEDFORD	DATE 7-1-43 EX. NO. 1-A	



**~~SECRET~~**

H.D. OF NEW BEDFORD <b>CURRENT TACTICAL ORGANIZATION</b>		REVISED DATE
PREPARED BY HARBOR DEFENSES OF NEW BEDFORD	DATE <u>7-1-43</u> EX.NO. <u>2-A</u>	

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2nd Ind to 1tr CG, ASF, dtd 23 Oct '45, Subj: "Status of Government Land"  
(Cont'd):

f. Location 55, Site #1, West Island, 14.2 acres, fire control station, mess hall and barracks (buildings destroyed by hurricane of 14 September 1944 - surveyed) owned in fee. Retention recommended.

5/6  
g. Location 56D, Site #1, Peases Point. Originally occupied under lease as a searchlight position. No further interest, lease has been cancelled.

2-5-3  
#4  
h. Location 56C, Site #1, Butlers Point, 4.1 acres, 2-90mm gun blocks and 2-155mm Panama mounts, formerly occupied under lease. Lease cancelled by supplemental agreement dated 1 December 1944 reserving right of re-entry in event of emergency need for national Defense.

i. Location 57, Site #1, Cuttyhunk, 3.75 acres, fire control station for Battery 210, owned in fee. Retention recommended.

j. Location 57, Site #2, Cuttyhunk, 0.70 acres, group station and fire control station for Battery Milliken, owned in fee. Retention recommended.

7-10-43  
k. Location 57, Site #3, Cuttyhunk, 0.93 acres, barracks area, formerly occupied under lease. No further interest, declared surplus by letter this headquarters to Commanding General, Northeastern Sector, dated 26 April 1945, file HU 801.53 (HD New Bedford), subject "Surplus Installations."

l. Location 57, Site #4, Cuttyhunk, 2.65 acres, radar site, owned in fee. Retention recommended.

17-5  
22  
m. Location 57A, Site #1, Cuttyhunk, 10.39 acres, barracks area. No further interest with exception of 2-90mm gun blocks as indicated in letter referred to in paragraph k, above.

n. Location 57B, Site #1, Nashawena Island, 34.7 acres, barracks area, 2-90mm gun blocks. No further interest with exception of 2-90mm gun blocks as indicated in letter referred to in paragraph k, above.

o.- Location 57B, Site #8, Nashawena Island. Dock destroyed by hurricane of 14 September 1944, abandoned. No further interest.

p. Location 58, Site #1, Naushon Island, 2.91 acres, fire control station and troop housing. Recommend reduction in acreage and retention of sufficient area for fire control stations and necessary rights of ingress and egress, and cable easements. Attention is invited to letter referred to in paragraph k, above.

q. Location 58, Site #2, Naushon Island, 2.19 acres, fire control stations and troop housing. See comments under paragraph p, above. Wharf destroyed by hurricane of 14 September 1944 and abandoned - recommend elimination.

Classification:	
DECLASSIFIED	
NND 760162	
By	NARS, Date 7-10-92

-3-  
~~SECRET~~

SURVEY OF ACREAGE REQUIREMENTS  
HARBOR DEFENSES OF NEW BEDFORD

<u>LOCATION</u>	<u>ACREAGE</u>	<u>COMBAT UNIT</u>	<u>GOVT. OWNED</u>	<u>LEASED</u>	<u>SURPLUS</u>	<u>REMARKS</u>
Port Rodman	69 Acres	Harbor Defense	69 Acres	None	None	
Mishaum Pt.	26.91 "	" "	26.84 Acres	.07 Acre	"	Lease for water supply
West Island	14.2 "	" "	14.2 "	None	"	Fire Control Site
Gooseberry Rk.	6.5 "	" "	6.5 "	"	"	Fire Control Site
Gayhead	4.02 "	" "	3.82 "	.2 Acres	"	Fire Control Site
Cuttyhunk Is.	23.4 "	" "	7.1 "	16.3 "	LEASED land declared surplus	F.C. Sta., AMTB, R
Nashawena Is.	34.98 "	" "	----	34.98 Acres	" "	AMTB Site
Round Hill	1.865 "	" "	----	1.865 "	Reduction in size of lease under way	Fire Control Site
Butler's Pt.	.12 Acres	Harbor Defense	----	.12 Acres	None	AMTB (Gun Block)
Taber Mill	3.3 Acres	Ordnance Warehouse	----	3.3 Acres	To be declared surplus by using arm	Special Purp
Colonial Pier	6.34 Acres	Dockage Facilities	----	6.34 "	To be declared surplus	Special Purp
Naushon Island	.11 "	Harbor Defense	----	.11 "	None	Fire Control

**CONFIDENTIAL**

By J. G. FICHE  
J. G. FICHE, Captain, C.E.  
19 May 1946

DECLASSIFIED	
By <u>02</u>	DATE <u>7-2-84</u>

HARBOR DEFENSES  
NEW BEDFORD, MA  
IN RG 160, COR  
PONDENCE, 1946  
BOX 26, SERIES

DECLASSIFIED PER EXECUTIVE ORDER 12356, SECTION 3.3, NND PROJECT  
 NUMBER NND 735034 BY RB/USW, DATE 6/21/94

SECRET

1942/43

GENERAL CHARACTERISTICS OF THE 90-MM ANTI-MOTOR TORPEDO BOAT

BATTERY

*Filed  
Bw*

1. The motor torpedo boat which has been developed by all navies is highly maneuverable and some models have attained a speed of 70 miles per hour. Extensive tests and studies have determined that types of guns, carriages, and fire control heretofore available are not suitable for defense against attacks by motor torpedo boats. These tests indicate that we are faced with a new problem for which present equipment was not designed. The motor torpedo boat constitutes a target presenting such difficulty in hitting as to be analogous to the airplane. To meet this threat to shipping, special batteries with fire control equipment designed for the purpose are to be provided. In order finally to determine the number of batteries required in each harbor defense and to insure that they shall be sited to the best advantage, the following general characteristics are furnished as information.

2. The two guns are of 90-mm caliber on fixed mounts with remote control in direction and elevation, and with provision for manual control. The extreme range is 12,000 yards; the assumed maximum effective range is 8,000 yards corresponding to a time of flight of 15 seconds. The rate of fire is 25 rounds per gun per minute. High explosive shell with the M48 type impact fuze (short delay-superquick) will be furnished. This fuze usually detonates on water impact, with sufficient delay to obtain above-water burst on ricochet. The guns, mounts and ammunition will be available within about three months.

3. a. Computer. The TL2 type electric computer is to be furnished. This computer provides full ballistic corrections. Data are furnished the computer either from a short horizontal baseline or from a radar which will provide range and azimuth. Procurement of the computer is expected during the summer of 1943.

b. Radar. A special radar SCR-598 is being developed, the antenna of which is to be mounted on the roof of the BC-B<sup>1</sup> station with operating cabinets in the fire control room in the emplacement below. Should the target be visible, optical azimuths and radar ranges may be furnished by throwing a switch in the combined BC-B<sup>1</sup> station. Procurement of the radar may be expected late in the calendar year.

c. Baselines. It is contemplated that two short baselines will be employed, both terminating at the BC-B<sup>1</sup> station. Baselines ideally should be 3,330 yards long; it is important that they be of about this length in order that, while sufficiently long to cover the extreme range of 12,000 yards, they shall be no longer than is necessary, in order to simplify directing the distant observer on the target. The instrument height required to see the horizon at 12,000 yards is 27 feet above high water level.

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Incl. #2

- 1 -

F-3



DECLASSIFIED PER EXECUTIVE ORDER 12356, SECTION 3.3, NND PROJECT  
 NUMBER NNND 735034 BY RB/JSW, DATE 6/21/94

~~SECRET~~

d. Data transmission system. The Data Transmission System T20 from base-end stations and from the radar to the computer is to be provided. This data transmission system consists of transmitters installed on the azimuth instruments or on the radar and receivers installed in the computer. Transmission of continuous data is made over standard fire control cable. The receivers can be used to obtain intermittent data for use with the plotting board. Procurement of the data transmission system may be expected during the latter part of 1943.

e. Emplacement.

(1) The guns are forty yards apart. The traverse, retired sufficiently to provide fully 170 degrees of horizontal fire, will provide storage of 800 rounds of ammunition per gun, about 25 rounds being accommodated at each gun. The fire control room will provide for the standby fire control equipment, the computer and the radar operating cabinets. The standby equipment is as follows, data being transmitted by telephone to the guns.

Plotting and Relocating Cloke Board, 1923

Wind Component Indicator M1

Percentage Corrector M1

(2) The BC-B<sup>1</sup> station is to be constructed on top of the traverse, located so as to provide a distance of not less than 100 feet from the guns to reduce interference from smoke and dust. In addition to the base-end observation instrument, two azimuth instruments will provide the means of observing the effect of fire in range and deflection. At night or in periods of low visibility, spotting may be accomplished by the radar.

f. Searchlights.

(1) The standard 60-inch searchlight is to be furnished, modified to provide a spread beam when wanted. The device for spreading the beam is under development by the Corps of Engineers. The change from concentrated beam to spread beam or the reverse is to be accomplished by throwing a switch and is expected to be nearly instantaneous.

(2) As the existing installation of seacoast searchlights will be available to assist in the illumination of motor torpedo boats, it may be assumed for planning purposes that one additional special searchlight with spread beam equipment will be furnished for each anti-motor torpedo boat battery.

4. Sites. In order that advantage may be taken of the flat trajectory of these high velocity guns, low sites are to be preferred. The mount permits a depression angle of 8 degrees. To meet extreme cases where high sites are unavoidable, the computer is designed to correct

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- 2 -

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F-3

DECLASSIFIED PER EXECUTIVE ORDER 12356, SECTION 3.3, NND PROJECT  
NUMBER MMDS 735036 BY RB/USW, DATE 6/21/94

~~SECRET~~

for sites up to 550 feet. It is desirable to select sites of about 100 feet or less where sacrifice of important portions of the field of fire will not be entailed.

5. Summary.

a. The guns, mounts and ammunition are expected to be ready by the time sites have been selected. Battery construction may be undertaken as soon as authorized and it is estimated that construction will require about four months. Anti-motor torpedo boat batteries, then, operating with standby fire control equipment may be made ready during the spring of 1943.

b. Specially designed fire control equipment is expected to be available at the following approximate times:

- (1) Computer, T12 type: During the summer of 1943.
- (2) Data Transmission System T20: During the latter part of 1943.
- (3) Radar SCR-598: Late in 1943.

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DECLASSIFIED PER EXECUTIVE ORDER 12356, SECTION 3.3, NND PROJECT  
NUMBER 11/11/88 735034 BY RB/USW, DATE 6/21/94

Tab A

Distribution Schedule for 90mm Guns for AA-Anti-Air Torpedo Boat Defense

Priority	Harbor Defense or Base	Quantity On Fixed Cge AMB	Or. cte MAL w/r.c.c.
1	-Argentina	6	6
2	-Portland	20	20
3	1 Dutch Harbor	8	8
4	1 Kodiak	6	6
5	1 Seward	4	4
6	1 Sitka	4	4
7	-Iceland	16	16
8	-Greenland	4	4
9	-Pearl Harbor	8	8
10	-Honolulu	4	4
11	-Manoia Bay	4	4
12	-Cristal	4	4
13	-Balboa	4	4
14	-San Francisco	8	8
15	-Los Angeles	18	18
16	-Puget Sound	12	12
17	-San Diego	8	8
18	-Boston	10 16	10
19	-Narragansett Bay	8	8
20	-Southern New York	6	6
21	-Andy Hook	4	4
22	-Chesapeake Bay	8	8
23	-Delaware	6	6
24	-Portsmouth	4 6	4
25	-Long Island Sound	8 10	8
26	-Charleston	4	4
27	-Barruda	4	4
28	1 San Juan	4	4
29	1 Trinidad *	8	8
30	1 St. Thomas	4	4
31	-Columbia	4	4
32	-Key West	4	4
33	-Galveston	2	2
34	-Pensacola	2	2
35	-Buzzards Bay	8	8
36	-Eastern New York	2	2
37	1 Roosevelt Roads *	12	12
Total		<u>254</u>	<u>254</u>
		250	254

\* To be held in Ordnance Storage pending further instructions from this Headquarters.

Incl. #1.

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F-3

DECLASSIFIED PER EXECUTIVE ORDER 12356, SECTION 3.3, NND PROJECT  
 NUMBER 11/108 735034 BY RB/USW, DATE 6/21/94

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EQUIPMENT, 90-MM ANTI-MOTOR TORPEDO BOAT BATTERY

1. a. Base-end stations, B<sup>2</sup> and B<sup>3</sup>; each:

- 1 Azimuth Instrument M1910A1, with data transmitter
- 2 Telephone Boxes EE-91 and Head and Chest Sets HS-17-A
- 1 Time Interval Bell

b. BC-B<sup>1</sup> station.

- 1 Azimuth Instrument M1910A1, with data transmitter
- 2 Azimuth instruments (spotters, range and direction)
- 4 Telephone Boxes EE-91 and Head and Chest Sets HS-17-A
- 1 Time Interval Bell
- Antenna for SCR-598

c. Plotting room.

- 1 Plotting and Relocating Cloke Board M1923, scale one inch equals 300 yards
- 7 Telephone Boxes EE-91 and Head and Chest Sets HS-17-A
- 1 Wind Component Indicator M1
- 1 Percentage Corrector M1
- 1 Time Interval Bell
- 1 Switchboard BD-95
- 2 Data Transmission Receivers
- 1 Gun Data Computer, T12 type
- Operating elements SCR-598 Radar

d. Emplacement.

- 2 90-mm Guns M1 on fixed Mount T3, with Remote Control System M2 and with Sighting System T16
- 4 Telephone Boxes EE-91 and Head and Chest Sets HS-17-A (off carriage) with weatherproof Boxes BE-63
- 1 Generator, 35-KVA, M7, (with alternately commercial or fortification power, or one spare 35-KVA Generator M7)
- 1 Power switchboard

e. Searchlight.

- 1 Standard 60-inch portable type searchlight with spread beam attachment
- 2. The baselines, plotting board, percentage corrector and time interval system constitute emergency and standby fire control equipment.

Incl. #1

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DECLASSIFIED PER EXECUTIVE ORDER 12356, SECTION 3.3, NND PROJECT  
 NUMBER 135034 BY RB/USW, DATE 6/21/94

~~SECRET~~

## TAB B

Redistribution of 37mm AA Guns, M1A2, on Carriages M3, or M3L, for  
 use as substitute A/TB Weapons.

TO:	QUANTITY	FROM	AGENCY RESPONSIBLE FOR TRANSFER
Argentia	6	Greenland surplus	Commanding General, Greenland Base Command
Portland	20	Undershipment	Chief of Ordnance
Dutch Harbor	8	Alaska	Commanding General, Alaska Def. Comd.
Kodiak	6	Alaska	" " " " "
Ceward	4	Alaska	" " " " "
Sitka	4	Alaska	" " " " "
Iceland	16	Iceland	" " Iceland Base Comd.
Greenland	4	Greenland	" " Greenland " "
Pearl Harbor	8	Hawaii	" " Hawaiian Department
Honolulu	4	Hawaii	" " " " "
Kaneohe Bay	4	Hawaii	" " " " "
Cristobal	4	Panama	" " Panama Canal Dept.
Balboa	4	Panama	" " " " "
San Francisco	3	Western Def. Comd.	" " Western Def. Comd.
Los Angeles	18	" " "	" " Western Def. Comd.
Puget Sound	12	" " "	" " " " "
San Diego	8	" " "	" " " " "
Boston	10	8 under shipment 2 from JDC; surplus	Chief of Ordnance
Narragansett Bay	8	Western Def. Comd. surplus	" " " <i>See Amendment</i>
Southern New York	6	" " " " "	" " " <i>This in closure</i>
Sandy Hook	4	" " " " "	" " " <i>12/22/42, file</i>
Chesapeake Bay	8	" " " " "	" " " <i>about, under</i>
Delaware	6	" " " " "	" " " <i>Cm-13979-A</i>
Portsmouth	4	" " " " "	" " " <i>BW</i>
Long Island Sound	3	" " " " "	" " " <i>Chief of Ordnance</i>
Charleston	4	" " " " "	" " " <i>Chief of Ordnance</i>
Bermuda	4	Puerto Rican Department	Commanding General, Puerto Rican Dept.
San Juan	4	" " " " "	" " " " "
Trinidad	3	Panama Canal Department	" " Panama Canal " "
St. Thomas	4	Puerto Rican " "	" " Puerto Rican " "
Columbia	4	Western Def. Comd.	" " JDC
Key West	4	" " " surplus	Chief of Ordnance
Galveston	2	" " " " "	" " " " "
Pensacola	2	" " " " "	" " " " "
Buzzards Bay	3	" " " " "	" " " " "
Eastern N.Y.	2	Newfoundland	Commanding General, Newfoundland Base C
Roosevelt Rds*	12	Alaskan Defense Comd. surplus	Chief of Ordnance.

TOTAL 254

F-3

\* To be held in Ordnance Storage pending further instructions from this Headquarters.

**RESTRICTED**  
HEADQUARTERS 243d COAST ARTILLERY (HD)

GENERAL ORDER  
NUMBER 1

Fort Getty, R.I.,  
12 January 1944.

C.W.S.  
1000  
#5  
FILE  
JAN 1944  
88

1. There is published hereon for the information of all concerned, a tabulation of scores of target practices conducted by batteries of this regiment from 1 January 1942 to 31 December 1943 inclusive:

ORGANIZATION AND BATTERY	ARMAMENT	DATE FIRED	TYPE OF PRACTICE	CASE	SCORE
#B - Beavertail	155mm M1917A1	29 May 1942	Record - Day	II	+ 109.0
#I - Brenton Point	155mm M1917A1	5 June 1942	Record - Day	II	+ 73.1
#F - Dickenson	6-inch BC	15 June 1942	Record - Day	II	+ 39.7
#C - Crittenden	3-inch BC	20 June 1942	Record - Day	II	+ 127.9
#H - Fort Adams	3-inch AA	5 July 1942	Record - Day	III	+ 81.0
#G - Ft. Wetherill	3-inch AA	22 July 1942	Record - Day	III	+ 160.2
#J - Wheaton	12-inch BC	3 Aug 1942	Record - Day	II	+ 76.4
#U - Varnum	12-inch BC	3 Aug 1942	Record - Day	II	+ 127.4
#K - Crittenden	3-inch BC	24 Aug 1942	Record - Day	II	+ 166.3
#G - Ft. Wetherill	3-inch AA	10 Sept 1942	Special Service	I	Not Scored
#H - Fort Adams	3-inch AA	26 Sept 1942	Record - Day	III	+ 278.3
#L - Whiting	3-inch BC	20 Oct 1942	Record - Day	II	+ 131.4
#P - Cran	6-inch BC	21 Oct 1942	Functional	II	Not Scored
#H - Fort Adams	3-inch AA	28 Oct 1942	Special Service	I	Not Scored
#C - Crittenden	3-inch BC	29 Oct 1942	Record - Night	II	- 18.1
#A - House	6-inch BC	19 Nov 1942	Record - Day	II	+ 116.9
#P - Wheaton	12-inch BC	8 Jan 1943	Record - Day	III	+ 76.4
#U - Varnum	12-inch BC	23 Jan 1943	Record - Day	III	+ 120.8
#G - Whiting	3-inch BC	23 Jan 1943	Record - Day	II	+ 135.0
#B - Beavertail	155mm M1917A1	25 Feb 1943	Record - Day	II	+ 18.8
#I - Point Judith	155mm M1917A1	25 Feb 1943	Record - Day	II	+ 45.9
#G - Ft. Wetherill	3-inch AA	31 July 1943	Record - Day	III	+ 92.3
#C - ANTB No. 1	90mm M1	12 Aug 1943	Calibration	III	Not Scored
#B - Beavertail	155mm M1917A1	12 Aug 1943	Record - Day	II	+ 153.8
#A - House	6-inch BC	19 Aug 1943	Special Service	II	+ 39.4
#H - Fort Adams	3-inch AA	23 Aug 1943	Record - Day	III	+ 91.3
#I - ANTB No. 2	90mm M1	10 Sept 1943	Calibration	III	Not Scored
#I - ANTB No. 2	90mm M1	21 Sept 1943	Special Service	III	+ 69.9
#C - ANTB No. 1	90mm M1	5 Oct 1943	Special Service	III	+ 25.5
#B - Beavertail	155mm M1917A1	20 Oct 1943	Special Service	II	+ 135.0
#I - ANTB No. 2	90mm M1	2 Nov 1943	Special Service	III	+ 56.2
#A - House	6-inch BC	3 Nov 1943	Calibration	II	Not Scored
#G - Whiting	3-inch BC	10 Nov 1943	Special Service	II	+ 179.3
#C - ANTB No. 1	90mm M1	12 Nov 1943	Special Service	III	+ 92.7
#I - ANTB No. 2	90mm M1	22 Nov 1943	Record - Day	III	+ 162.3
#C - ANTB No. 1	90mm M1	24 Nov 1943	Special Service	III	+ 78.1
#A - House	6-inch BC	8 Dec 1943	Record - Day	II	+ 68.3
#F - Perry 7211	6-inch BC	10 Dec 1943	Calibration	III	Not Scored
#G - Whiting	3-inch BC	10 Dec 1943	Special Service	II	+ 26.0
#C - ANTB No. 1	90mm M1	14 Dec 1943	Record - Day	III	+ 60.4
#B - Beavertail	155mm M1917A1	22 Dec 1943	S.S. Sect.	II	+ 113.1
			Comdr. Action		

By order of COLONEL DATSON:

OFFICIAL: *Charles R. Hicks Jr.*  
CHARLES R. HICKS Jr.,  
Captain, 243d CA (HD),  
Adjutant.

CHARLES R. HICKS Jr.,  
Captain, 243d CA (HD)  
Adjutant.

G.O. No. 13 is the last of the 1943 series.  
**RESTRICTED**

ORDNANCE AND EXPLOSIVE WASTE  
ARCHIVES SEARCH REPORT  
FOR  
FORMER BUTLER POINT AMTB BATTERY  
MARION, MASSACHUSETTS  
PROJECT NUMBER D01MA050601

APPENDIX G

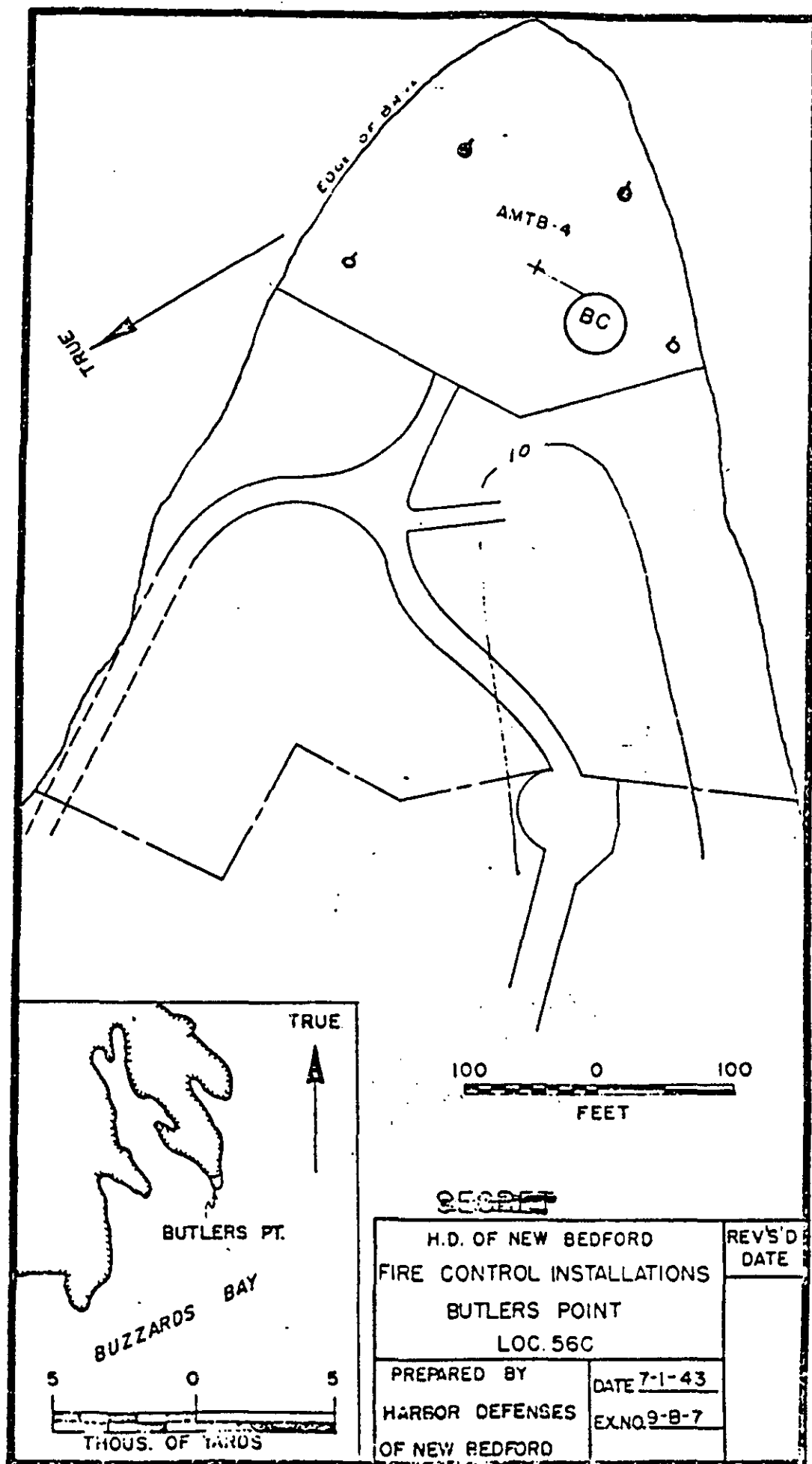
REAL ESTATE DOCUMENTS

APPENDIX G  
REAL ESTATE DOCUMENTS

Table of Contents

- G-1. 1943 boundary map (B-30).
- G-2. Realty control file summary (B-28).
- G-3. Current ownership (B-41).





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H.D. OF NEW BEDFORD  
FIRE CONTROL INSTALLATIONS  
BUTLERS POINT  
LOC. 56C

REV'S'D  
DATE

PREPARED BY  
HARBOR DEFENSES  
OF NEW BEDFORD

DATE 7-1-43  
EX. NO. 9-B-7

REALTY CONTROL FILE SUMMARY (Land Acquisitions and Disposals)				AUDIT NO. All Leased	
RESERVATION NAME <b>BUTLER POINT</b>			LOCATION <b>MASSACHUSETTS, In Plymouth County</b>		
DISTRICT			DIVISION <b>New England</b>		
OFFICIALLY DESIGNATED BY:			TYPE: <input checked="" type="checkbox"/> ARMY-REL <input type="checkbox"/> AIR FORCE <input type="checkbox"/> AGC <input type="checkbox"/> ARMY-CIVIL <input type="checkbox"/> OTHER		PURPOSE <b>ID of New Bedford</b>
JURISDICTION		MAP <b>No Map</b>	RELOCATION		IMPELLING CAUSE
LAND OWNERSHIP AND COST DATA					
	AREA	DEED CATEGORY CODE	COST	Rental	
ACQUISITION (Column A)	0.47 Lease, Total Acres 922 Nominal				
DISPOSAL (Column B)	0.47 Lease, Total Acres 922 Nominal				
NET					
REMARKS * Lease No. W-2732-Eng-397, The Shippen Club of Marion, * Terminated period ending 2-15-48.  <b>C L O S E D</b>					

ENS FORM 1603  
1 MAY 48

REV 002-2-1950

REPLACES ENS FORM 6-100, 1 FEB 48, WHICH IS OBSOLETE.

022220

*Ref #12*



ORDNANCE AND EXPLOSIVE WASTE  
ARCHIVES SEARCH REPORT  
FOR  
FORMER BUTLER POINT AMTB BATTERY  
MARION, MASSACHUSETTS  
PROJECT NUMBER D01MA050601

APPENDIX H

NEWSPAPERS/JOURNALS

(Not Used)

ORDNANCE AND EXPLOSIVE WASTE  
ARCHIVES SEARCH REPORT  
FOR  
FORMER BUTLER POINT AMTB BATTERY  
MARION, MASSACHUSETTS  
PROJECT NUMBER D01MA050601

APPENDIX I

INTERVIEWS

## APPENDIX I

### INTERVIEWS

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- I-1. FONECON with Mr. Albert Serpa.
- I-2. FONECON with COL (Ret) Alex Holder.
- I-3. FONECON with Mr. Dennis Lattrell.
- I-4. Interview of Mr. George Jennings.
- I-5. FONECON with TSGT Mike Perra.
- I-6. FONECON with Senior Chief Jack Ramsey.
- I-7. Interview of Mr. H. Edmund Tripp.
- I-8. FONECON with Mr. Lennie Blodgett.
- I-9. FONECON with Mr. Jesse Cunningham.
- I-10. Interview of Officer John Philbrook.
- I-11. FONECON with Mr. Duben Montoya.
- I-12. FONECON with Mr. Dennis Runsberg

Conversation Record

Date/Time: August 5, 1994 4:00 PM

Type: Telephone Call

Name: Albert Serpa

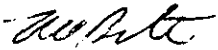
Title: Marion resident

Address: 375 Front Street  
Marion, MA 02738  
(508) 748-1413

Subject: Butler Point AMTB

Summary: Mr. Serpa stated that he was a teen-ager in Marion during WWII, and he knew about the gun battery at Butler Point. He said that the soldiers did fire their guns for target practice, because he recalls that the fishing boats were warned not to go out into the bay at certain times when the guns were scheduled to be fired.

He said the guns did not fire at the nearby Bird Island lighthouse but at targets out in the water. Mr. Serpa did not know what types of targets were used or what type of ammunition was used.

  
RONALD PLANTE  
CENCR-ED-DN

### Conversation Record

Date/Time: August 7, 1994 9:00 PM

Type: Telephone Call

Name: COL Alex Holder, FA (ret)

Title: Coastal defense historian

Address: 19 Harbor Heights Road  
Scituate, MA 02066  
(617) 545-1290

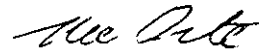
Subject: Butler Point AMTB

Summary: COL Holder stated that he is very interested in coastal defense sites and has visited Butler Point. He said that the second 90mm concrete mount is now buried in the sand east of the Panama mounts exactly 120 feet (center to center) from the still visible 90mm mount. COL Holder said he dug up this mount to verify its presence.

He further stated that this site was most likely set up with a 12' x 12' wooden shack as a battery commander (BC) station behind the four concrete gun mounts. The BC station would have been raised on concrete pilings. On both sides of the BC station were the mobile 90mm guns. There would also have been one or two ammunition storage structures close to the guns.

COL Holder said that the 155mm guns were removed when the fixed 90mm mounts were emplaced, noting that the 90mm mounts were placed directly in front of the Panama mounts. He speculated that there was very little practice firing because of the frequent ship traffic going to the Cape Cod Canal. COL Holder theorized that practice firings used service ammo because small units (as opposed to large training areas) would have difficulty obtaining training ammo. He also noted that the 12,000+ yard range of the 90mm guns limited the area where they could do their target practice. COL Holder added that this site probably did not have base end stations to plot targets.

He thought the site closed early in the war for several reasons. One was it's location far inside the bay. The other was the fact that the soldiers were needed to replace casualties in the Pacific and European theaters.

  
RONALD PLANTE  
CENCR-ED-DN



Conversation Record

Date/Time: August 5, 1994 7:00 PM

Type: Telephone Call

Name: Dennis Lattrell

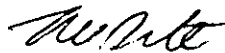
Title: Marion Conservation Commission Member

Address: 2 Spring Street  
Marion, MA 02738  
(508) 748-2876

Subject: Butler Point AMTB

Summary: Mr. Lattrell said that he works with the Audobon Society maintaining Bird Island as a sanctuary for the roseate tern. He stated that every spring the Society sends about 50 people to clean the 1 acre island and prepare nesting areas for the birds.

Mr. Lattrell stated that no one has ever found any item related to the Butler Point gun battery, including suspected ordnance. In addition, the commission is restoring the old lighthouse on the island, and there is no evidence suggesting that this structure was used as a target.

  
RONALD PLANTE  
CENCR-ED-DN

Conversation Record

Date/Time: August 9, 1994, 10:30AM

Type: Personal Interview

Name: George Jennings

Title: Marion Harbormaster

Address: 2 Spring Street  
Marion, MA 02738  
(508) 748-3535

Subject: Butler Point AMTB Battery

Summary: Mr. Jennings stated that he has been harbormaster for about 30 years and a waterman for over 50 years. He grew up in Falmouth, just across the bay from Marion. He is responsible for 35 square miles of water.

He was unaware of any OEW problems that may have been caused by the AMTB. Mr. Jennings knew of an item, possibly a depth charge, that was found near Woods Hole, but there was nothing he knows of from Butler Point. He said the bottom of Buzzard's Bay has about three feet of mud under a foot of silt, so anything there will be hard to find. Winter water visibility is about 30 feet, while in the summer it is about 3 feet.

Mr. Jennings added that the only dredging done in the bay is to the east in the Cleveland Channel by the Corps of Engineers. He added that some towns may do limited dredging within their harbors, but that is very rare because of the cost. He said that fishermen are not allowed to use nets in the bay, though scallopers do use scoops to drag the bottom. He had never heard of anyone pulling up ordnance from the bay.

The harbormaster did not know anything about live firing during WWII, but he did say that Buzzards Bay was a major convoy assembly area and was very busy during the war.

*Ronald Plante*  
RONALD PLANTE  
CENCR-ED-DN

Conversation Record

Date/Time: 11 August 1994, 11:00 AM

Type: Telephone Call

Name: TSGT Mike Perra

Title: EOD Technician

Address: 102nd EOD Flight  
Otis ANGB, MA 02542  
(508) 968-4861

Subject: OEW From Butler Point AMTB Battery

Summary: Tsgt Perra stated that he has been an EOD technician on the Cape for over 10 years and a Cape resident all his life. He has never heard of any recovered item that could be related to Butler Point. He said he was in Marion earlier this year, but the call was for a current issue MK 58 flare that had washed up on shore from a Navy ship.

He was unaware of anyone ever finding projectiles in Buzzard's Bay or on the surface north, east, or west of Butler Point. Tsgt Perra is an avid scuba diver and he has never found OEW of any kind in the bay. He added that the bottom has about 1' of silt, 3' of mud, and 8-10' of clay before bedrock.



RONALD PLANTE  
CENCR-ED-DN

Conversation Record

Date/Time: August 11, 1994 1:00 PM

Type: Telephone Call

Name: Senior Chief Jack Ramsey

Title: EOD Technician

Address: EOD Mobile Unit 2  
Newport, RI 02841  
(401) 841-3301/2

Subject: OEW from Butler Point AMTB Battery

Summary: Senior Chief Ramsey said that his unit is responsible for water ordnance disposal in Buzzards Bay and the surrounding area. He stated that a depth charge was recovered several years ago, and there has been other ordnance found, though it's origin is unknown. The usual method of discovery is for fishermen to bring up an item in their nets and then notify EOD.

He stated that no item recovered so far can be attributed to Butler Point, but noted that specific identification is virtually impossible after ordnance has been in shallow seawater for 40/50 years. Any metallic item will be heavily encrusted with marine growth and/or rust.

Senior Chief Ramsey offered the services of MU-2 if the Corps has any specific underwater areas that need to be searched for OEW.



RONALD PLANTE  
CENCR-ED-DN

Conversation Record

Date/Time: August 5, 1994 10:30 AM

Type: Personal Interview

Name: H. Edmund Tripp

Title: Marion Town Historian

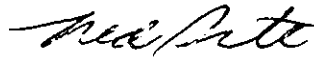
Address: Box 134  
Marion, MA 02738  
(508) 7480088

Subject: Butler Point AMTB Battery

Summary: Mr. Tripp stated that he is a lifelong resident of Marion and has been the town historian for about 30 years. He knew the Butler Point gun battery existed during the war, but the site was guarded by soldiers and thus inaccessible to the public. He knew little about the site but did say that the GIs used the golf course club house as their barracks and mess hall.

He had heard that the troops practiced firing at targets floating in the water, but he could not verify this himself. Mr. Tripp surmised that any firing would have been very infrequent, as Buzzards Bay was a major staging area for convoys going across the Atlantic. He said that the transport ships anchored in the Bay while waiting for additional ships to join the convoys.

Mr. Tripp wrote a book on the Town of Marion but he said it did not contain any additional information on the gun battery.

  
RONALD PLANTE  
CENCR-ED-DN

Conversation Record

Date/Time: August 26, 1994 12:00 PM

Type: Telephone Call

Name: Mr. Lennie Blodgett

Title: Superintendent, Kittansett Club

Address: 11 Point Road  
Marion, MA 02738  
(508) 748-1250

Subject: Butler Point AMTB Battery

Summary: Mr. Blodgett stated that he has been at the club since 1962. He has been to the gun site several times and has never seen anything other than the concrete mounts. He said that the clubhouse was used as a barracks, as were several nearby houses. He noted that members were allowed to play the 9 holes away from the battery. He was unaware of any USTs or construction other than the gun mounts. He has never heard of any ordnance item being found on the site.

He said that the former pier was wiped out in a hurricane "about 60" years ago, and erosion is wearing away the eastern side as well as part of the southern tip. Mr. Blodgett said there will never be any development of the former gun site because of it's exposure to high waves. The area is an ideal buffer protecting the golf course and residences.



RONALD PLANTE  
CENCR-ED-DN

Conversation Record

Date/Time: August 27, 1994 1:00 PM

Type: Telephone Call

Name: Mr. Jesse Cunningham

Title: Property Owner

Address: 6 Point Road  
Marion, MA 02738  
(508) 748-2286

Subject: Butler Point AMTB Battery

Summary: Mr. Cunningham stated that his house was built in 1935 or thereabouts, and he had heard from the previous owners that it may have been used as a barracks during WWII. He has seen the remaining gun mounts and knew about the AMTB site.

He said his family has lived in the house for 15 years, and they have never found OEW or any item that could be related to the gun site. Mr. Cunningham was unaware of anyone finding OEW or anything from the AMTB battery. He said the gun mounts are the only reminder of the site's history.



RONALD PLANTE  
CENCR-ED-DN

Conversation Record

Date/Time: August 5, 1994 11:00 AM

Type: Personal Interview

Name: John Philbrook

Title: Marion Police Department

Address: 28 Spring Street  
Marion, MA 02738  
(508) 748-1212

Subject: Butler Point AMTB Battery

Summary: Officer Philbrook said that he knew about the gun battery and had been to the site. He was not aware of any ordnance found at the site or any ordnance from WWII found in the area. He said he had heard of an old torpedo being recovered near Falmouth but nothing anywhere near Marion.

  
RONALD PLANTE  
CENCR-ED-DN



Conversation Record

Date/Time: September 9, 1994 11:00 AM

Type: Telephone call

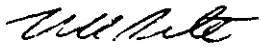
Name: John Philbrook

Title: Mr. Duben Montoya

Address: US Army Corps of Engineers  
Navigation Branch  
424 Trapelo Road  
Waltham, MA 02254  
(617) 647-8377

Subject: Butler Point AMTB Battery

Summary: Mr. Montoya stated that Corps has done dredging in the Cleveland Channel leading into the Cape Cod Canal east of Butler Point. He has never heard of any ordnance being dredged up in the channel or anywhere in Buzzards Bay.

  
RONALD PLANTE  
CENCR-ED-DN

Conversation Record

Date/Time: September 12, 1994 9:00 AM

Type: Telephone call

Name: Mr. Dennis Runsberg

Title: Cartographic Specialist

Address: National Ocean Survey  
Mapping & Charting Br  
1315 East West Highway  
Silver Spring, MA 20910  
(301) 713-2735

Subject: Underwater Ordnance

Summary: I called Mr. Runsberg regarding the marking of "unexploded ordnance" south of Woods Hole on NOA chart 13230 for Buzzards Bay. Mr. Runsberg stated that this marking was the resulted of an incident in 1990 where a fishing vessel netted a bomb which exploded when they dropped it back in the water, damaging the net and cables.

Mr. Runsberg said that Navy EOD technicians concluded that the item was either a WWII-era depth charge or aerial depth bomb and searched the area without finding any other ordnance.

*R. Plante*  
RONALD PLANTE  
CENCR-ED-DN

ORDNANCE AND EXPLOSIVE WASTE  
ARCHIVES SEARCH REPORT  
FOR  
FORMER BUTLER POINT AMTB BATTERY  
MARION, MASSACHUSETTS  
PROJECT NUMBER D01MA050601

APPENDIX J

PRESENT SITE PHOTOGRAPHS

APPENDIX J  
PRESENT SITE PHOTOGRAPHS

Table of contents

- J-1. Northern shoreline.
- J-2. 90mm concrete mount and 155mm Panama mounts.
- J-3. 90mm mount.
- J-4. 90mm mount.
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- J-6. 155mm Panama mount.
- J-7. Area of mobile 90mm and the buried 90mm mount.
- J-8. Support pillar for battery commander (BC) station.
- J-9. Area of BC station and ammo storage.
- J-10. Golf course club house.
- J-11. View toward impact area.
- J-12. Bird Island.





J-1. Northern shoreline.



J-2. 90mm concrete mount and 155mm Panama mounts.



J-3. 90mm mount.



J-4. 90mm mount.





J-5. 155mm Panama mounts.



J-6. 155mm Panama mount.



J-7. Area of mobile 90mm and the buried 90mm mount.



J-8. Support pillar for battery commander (BC) station.





J-9. Area of BC station and ammo storage.



J-10. Golf course club house.



J-11. View toward impact area.



J-12. Bird Island.



ORDNANCE AND EXPLOSIVE WASTE  
ARCHIVES SEARCH REPORT  
FOR  
FORMER BUTLER POINT AMTB BATTERY  
MARION, MASSACHUSETTS  
PROJECT NUMBER D01MA050601

APPENDIX K

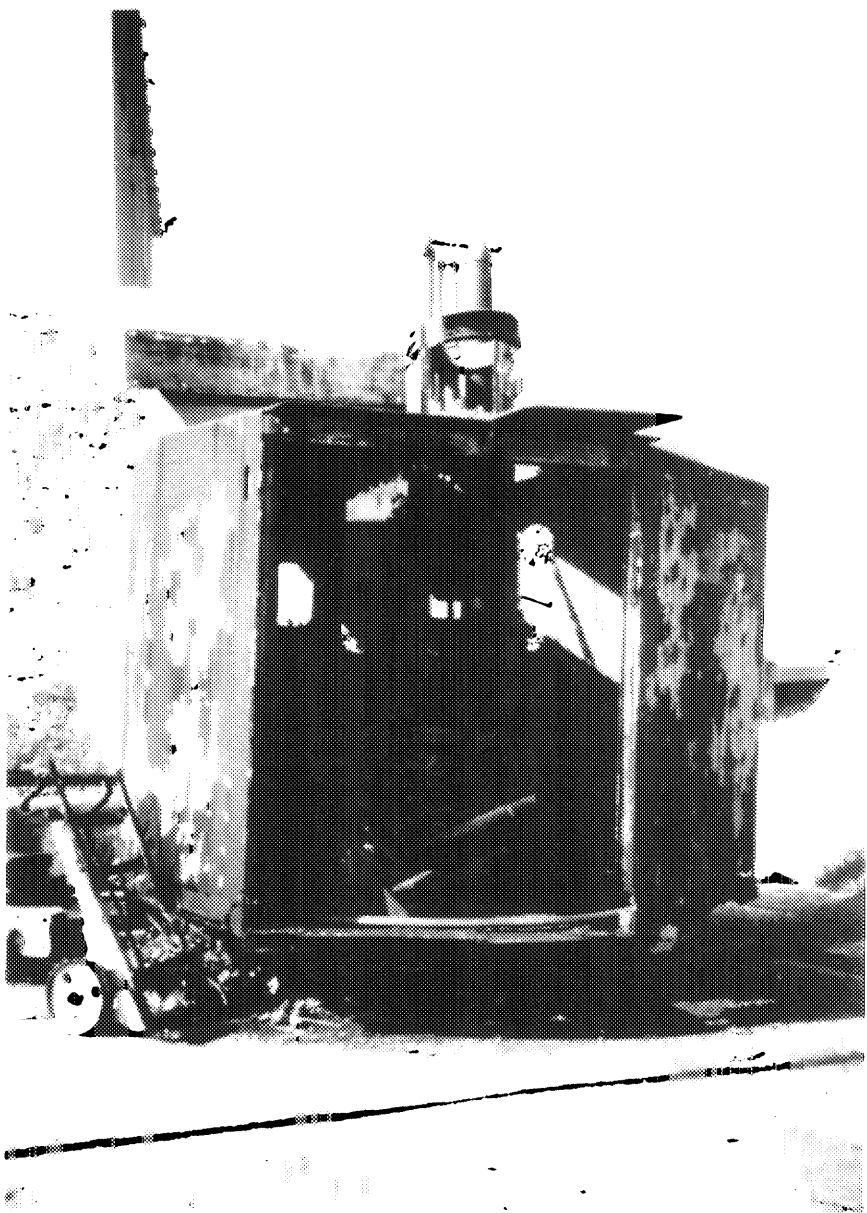
HISTORICAL PHOTOGRAPHS



Appendix K  
Historical Photographs

Table of Contents

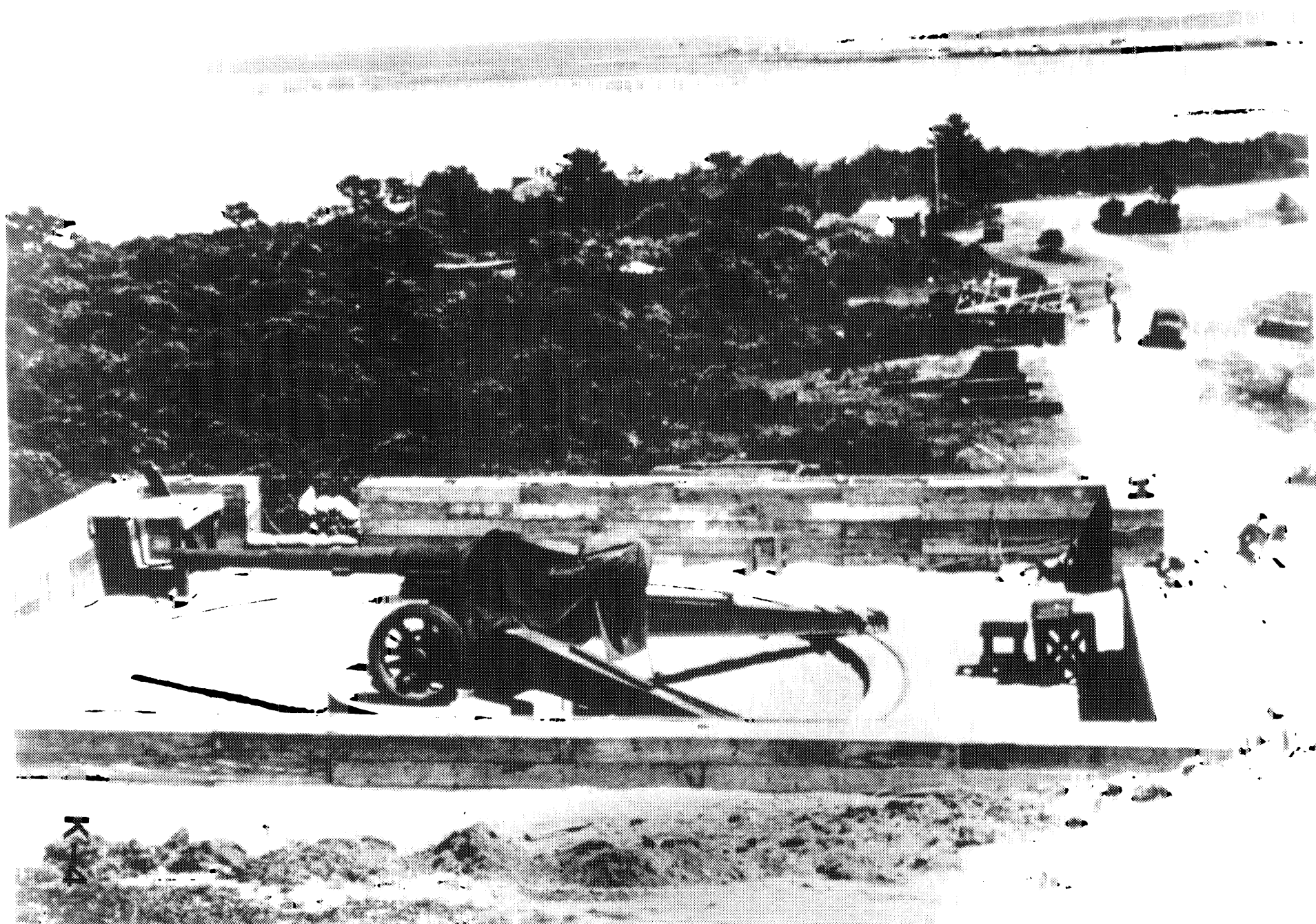
- K-1. Typical 90mm M3 fixed mount (left) and M1 mobile mount (B-39).
- K-2 thru K-4. Typical 155mm gun on Panama mount. Photos of the Sagamore Hill Battery by Lou Salza, provided by Ranger Frank Hagen of the New England Division, Cape Cod Canal Field Office.











ORDNANCE AND EXPLOSIVE WASTE  
ARCHIVES SEARCH REPORT  
FOR  
FORMER BUTLER POINT AMTB BATTERY  
MARION, MASSACHUSETTS  
PROJECT NUMBER D01MA050601

APPENDIX L

REFERENCE MAPS/DRAWINGS

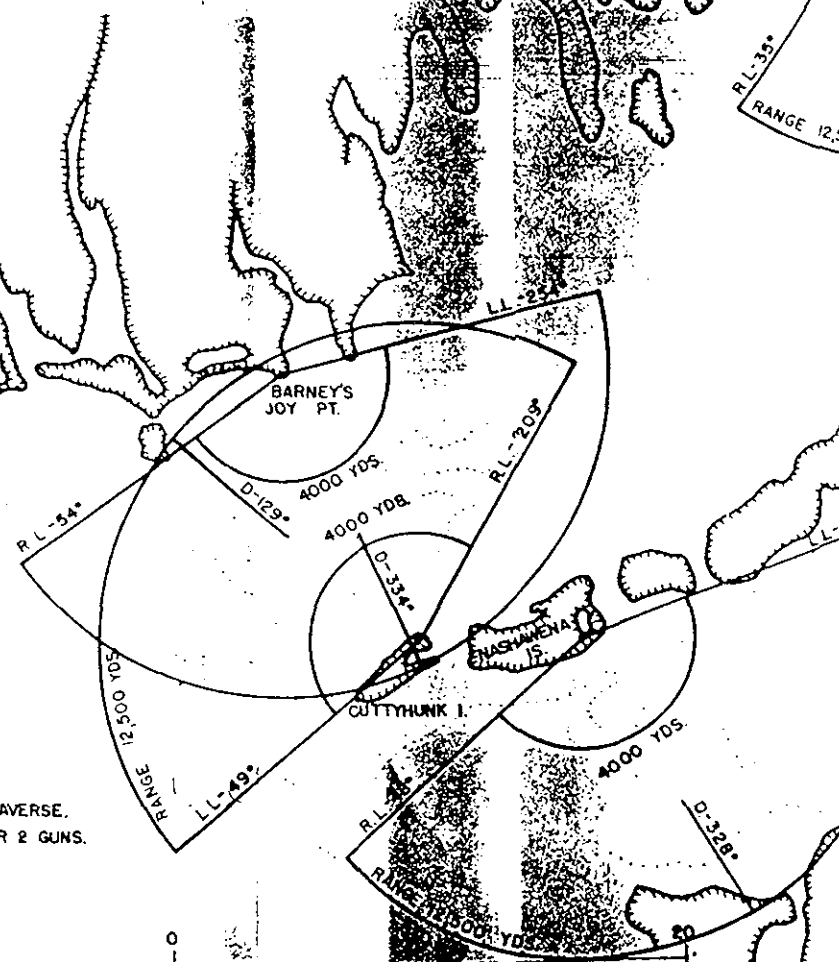
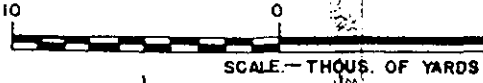
APPENDIX L  
REFERENCE MAPS/DRAWINGS

Table of Contents

- L-1. Fields of fire as of 7-1-43 (B-30).
- L-2. Master Plan for Butler Point (B-40).



NOTE ALL GUNS HAVE 360° TRAVERSE.  
FIELDS OF FIRE SHOWN ARE FOR 2 GUNS.



**SECRET**

OF NEW BEDFORD  
FIELDS OF FIRE  
BATTERIES

REVISED  
DATE



NOTE: NO LIMITS TO AREA  
LEASED DESIGNATED

GOLF COURSE

ASPHALT ROAD

CEMENT WALK

PIER

(GUN BLOCKS COVERED WITH  
EARTH & 300)

ELEVATION APPROXIMATELY  
3' ABOVE SEA LEVEL

GUN BLOCKS

BUZZARDS BAY

SCALE IN FEET

3 60' 0 60'

LEASED

REVISED: 31 MARCH, 1947

MASTER PLAN

HARBOR DEFENSES OF NARR BAY RI

BUTLER'S POINT

A.M.T.B. NO. 934

SITE PLAN

10 JULY, 1946 FILE NO. H.D.N.B.

19/1000

ORDNANCE AND EXPLOSIVE WASTE  
ARCHIVES SEARCH REPORT  
FOR  
FORMER BUTLER POINT AMTB BATTERY  
MARION, MASSACHUSETTS  
PROJECT NUMBER D01MA050601

APPENDIX M

ARCHIVES SEARCH REPORT CORRESPONDENCE

(Not Used)

ORDNANCE AND EXPLOSIVE WASTE  
ARCHIVES SEARCH REPORT  
FOR  
FORMER BUTLER POINT AMTB BATTERY  
MARION, MASSACHUSETTS  
PROJECT NUMBER D01MA050601

APPENDIX N  
REPORT DISTRIBUTION LIST

ORDNANCE AND EXPLOSIVE WASTE  
ARCHIVES SEARCH REPORT  
FOR  
FORMER BUTLER POINT AMTB BATTERY  
MARION, MASSACHUSETTS  
PROJECT NUMBER D01MA050601

APPENDIX N

REPORT DISTRIBUTION LIST

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I - Final Report  
II - Findings Report  
III - Routed Final Report

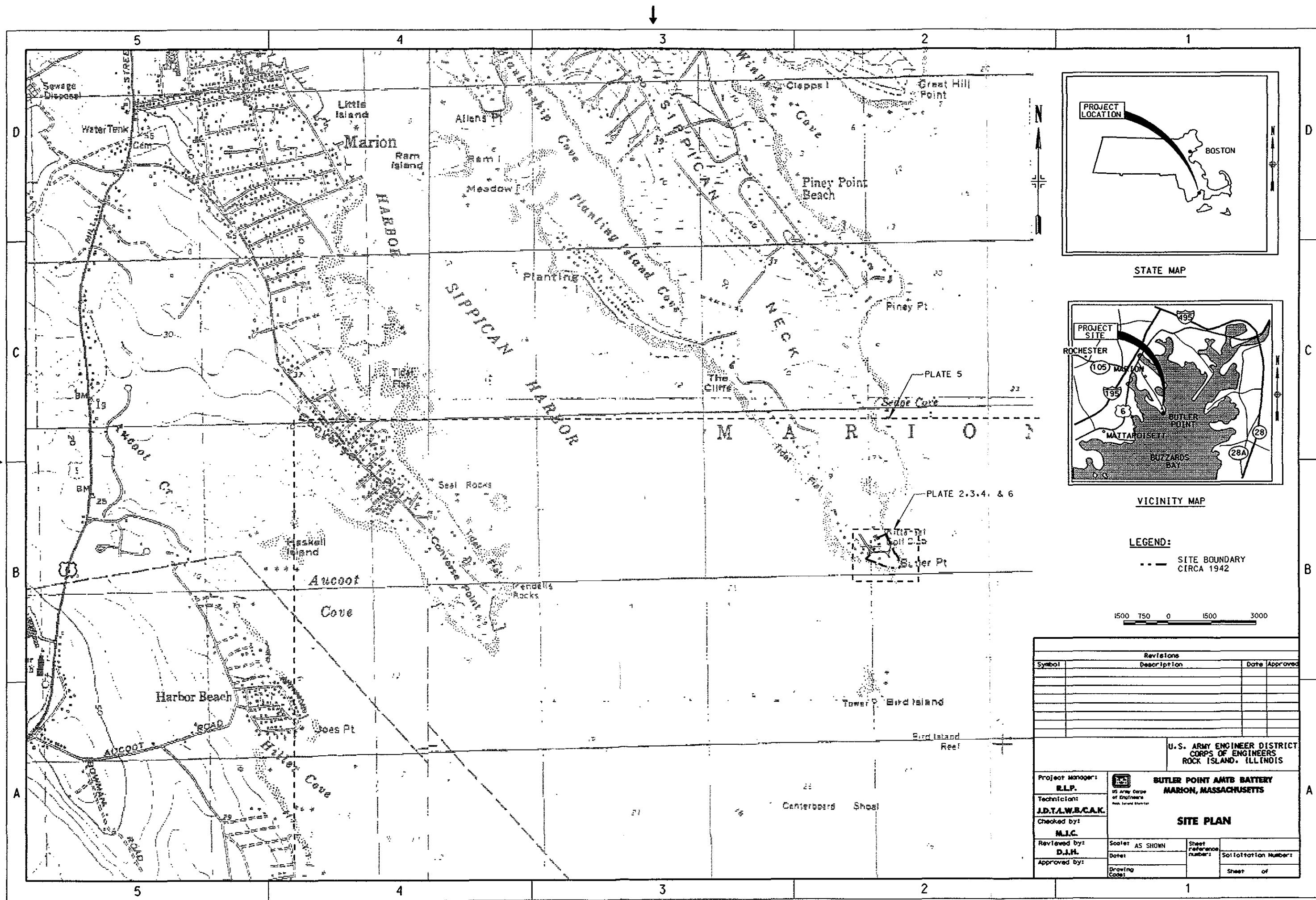
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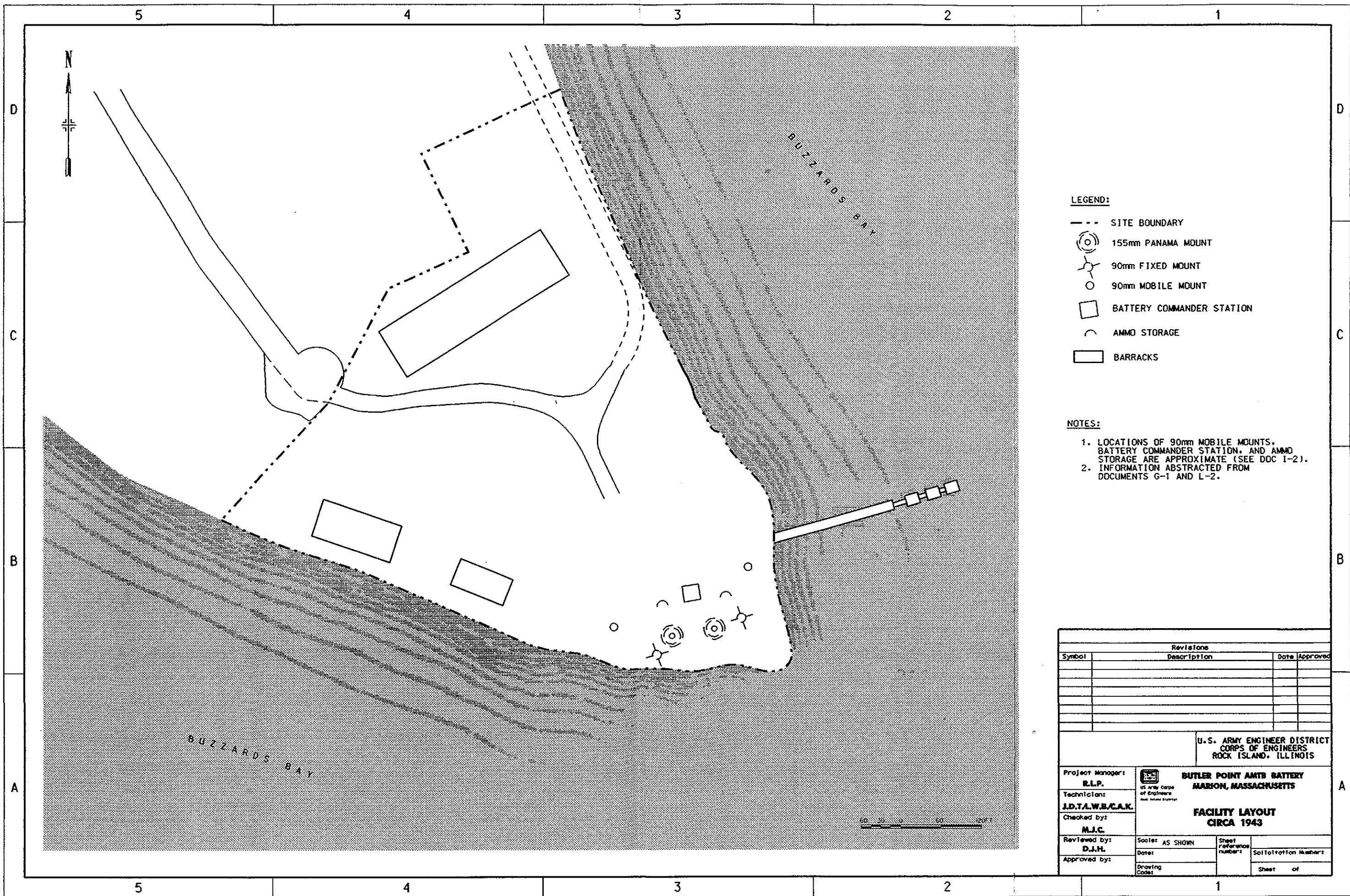
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-ED-H	-	-	1
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I - Final Report  
 II - Findings Report  
 III - Routed Final Report

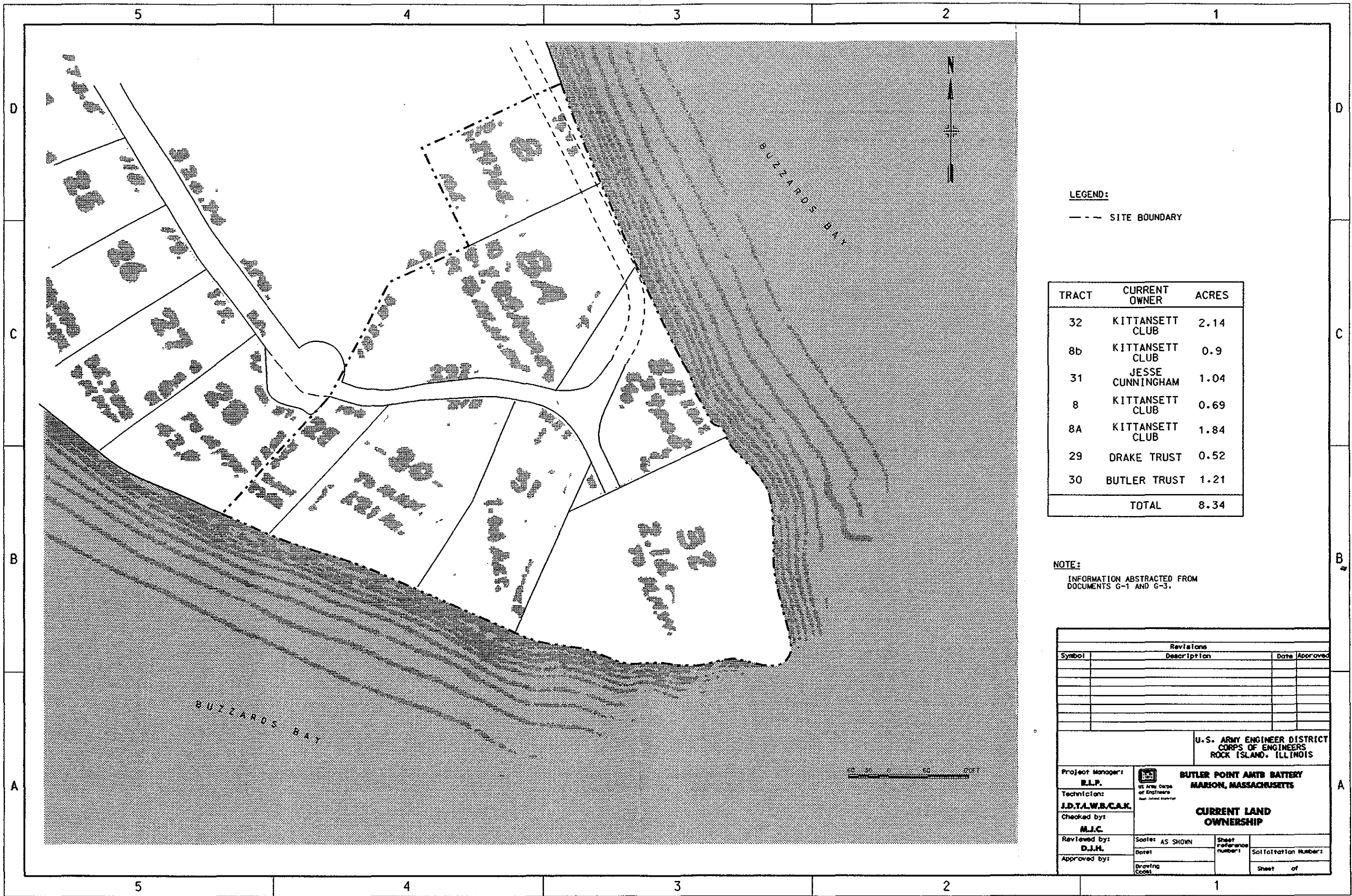
ORDNANCE AND EXPLOSIVE WASTE  
ARCHIVES SEARCH REPORT  
FOR  
FORMER BUTLER POINT AMTB BATTERY  
MARION, MASSACHUSETTS  
PROJECT NUMBER D01MA050601

REPORT PLATES









**LEGEND:**

--- SITE BOUNDARY


TRACT	CURRENT OWNER	ACRES
32	KITTANSETT CLUB	2.14
8b	KITTANSETT CLUB	0.9
31	JESSE CUNNINGHAM	1.04
8	KITTANSETT CLUB	0.69
8A	KITTANSETT CLUB	1.84
29	DRAKE TRUST	0.52
30	BUTLER TRUST	1.21
TOTAL		8.34

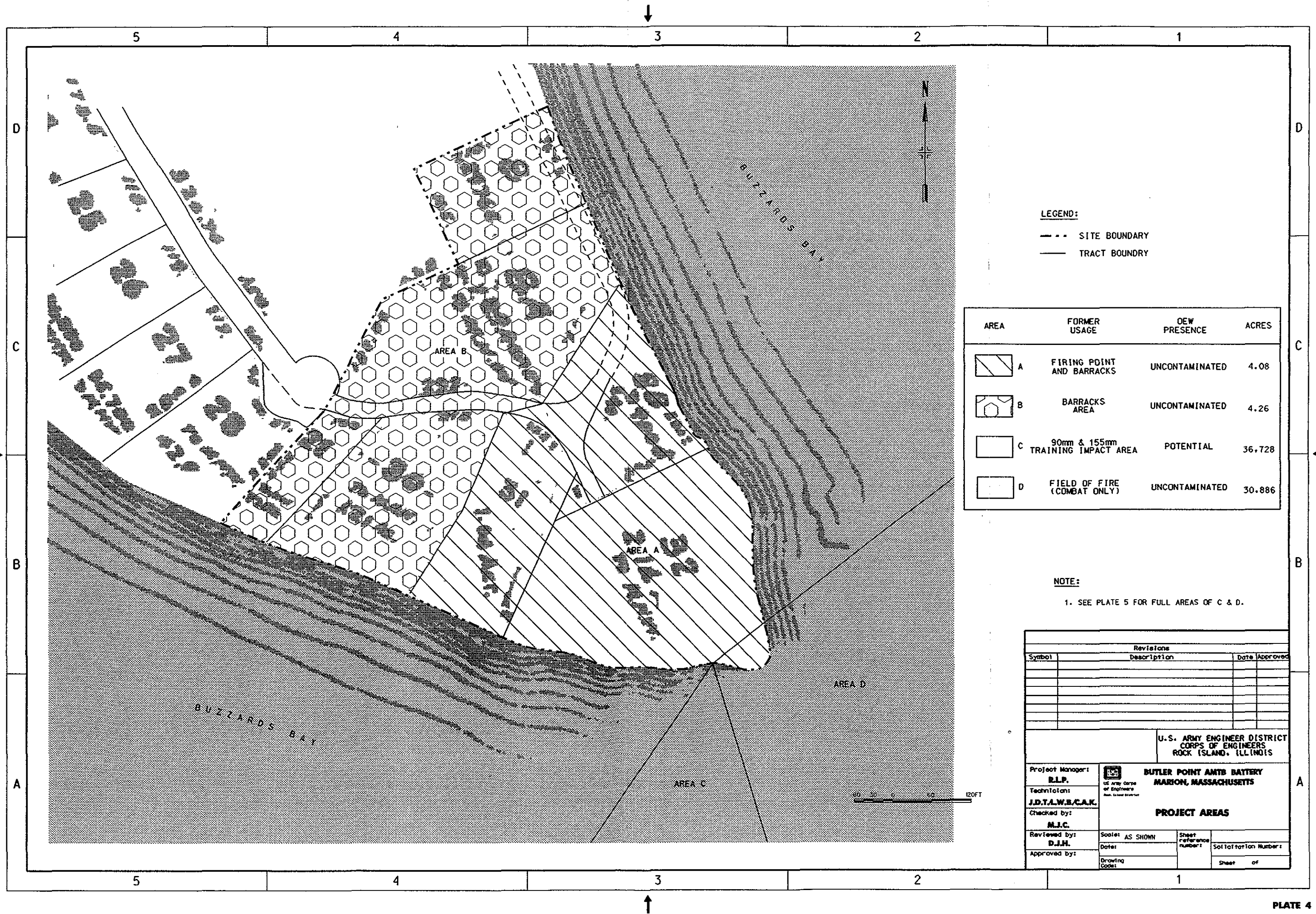
**NOTE:**

INFORMATION ABSTRACTED FROM DOCUMENTS G-1 AND G-3.

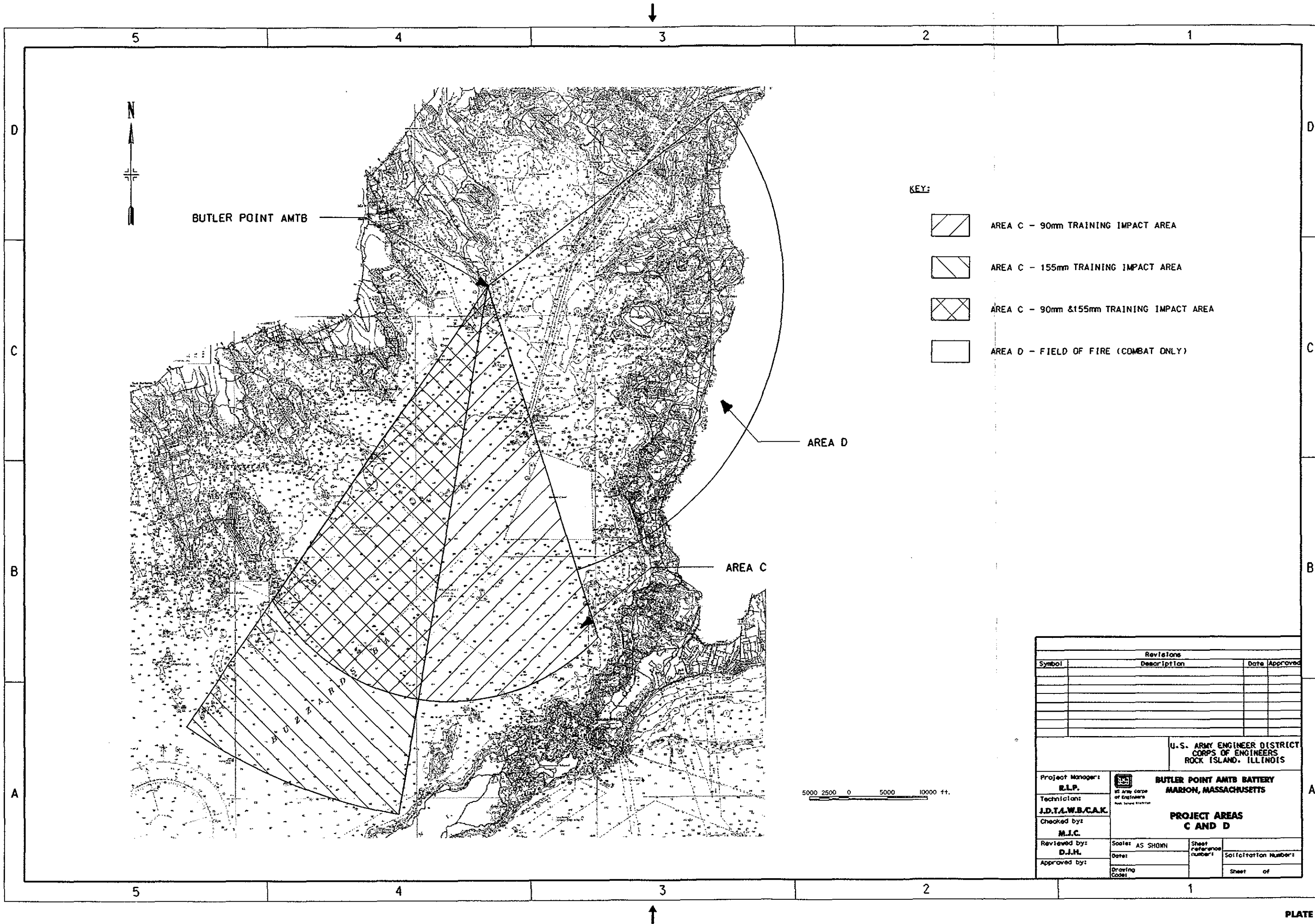
Revisions			
Symbol	Description	Date	Approved





U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS ROCK ISLAND, ILLINOIS	
Project Manager: <b>R.L.P.</b>	 <b>BUTLER POINT AMTB BATTERY</b> <b>MARION, MASSACHUSETTS</b>
Technician: <b>J.D.T.A.W.B.C.A.K.</b>	
Checked by: <b>M.J.C.</b>	<b>CURRENT LAND OWNERSHIP</b>
Reviewed by: <b>D.J.H.</b>	Scale: AS SHOWN
Approved by:	Sheet reference number: Drawing Code: Solicitation Number: Sheet of:








**KEY:**

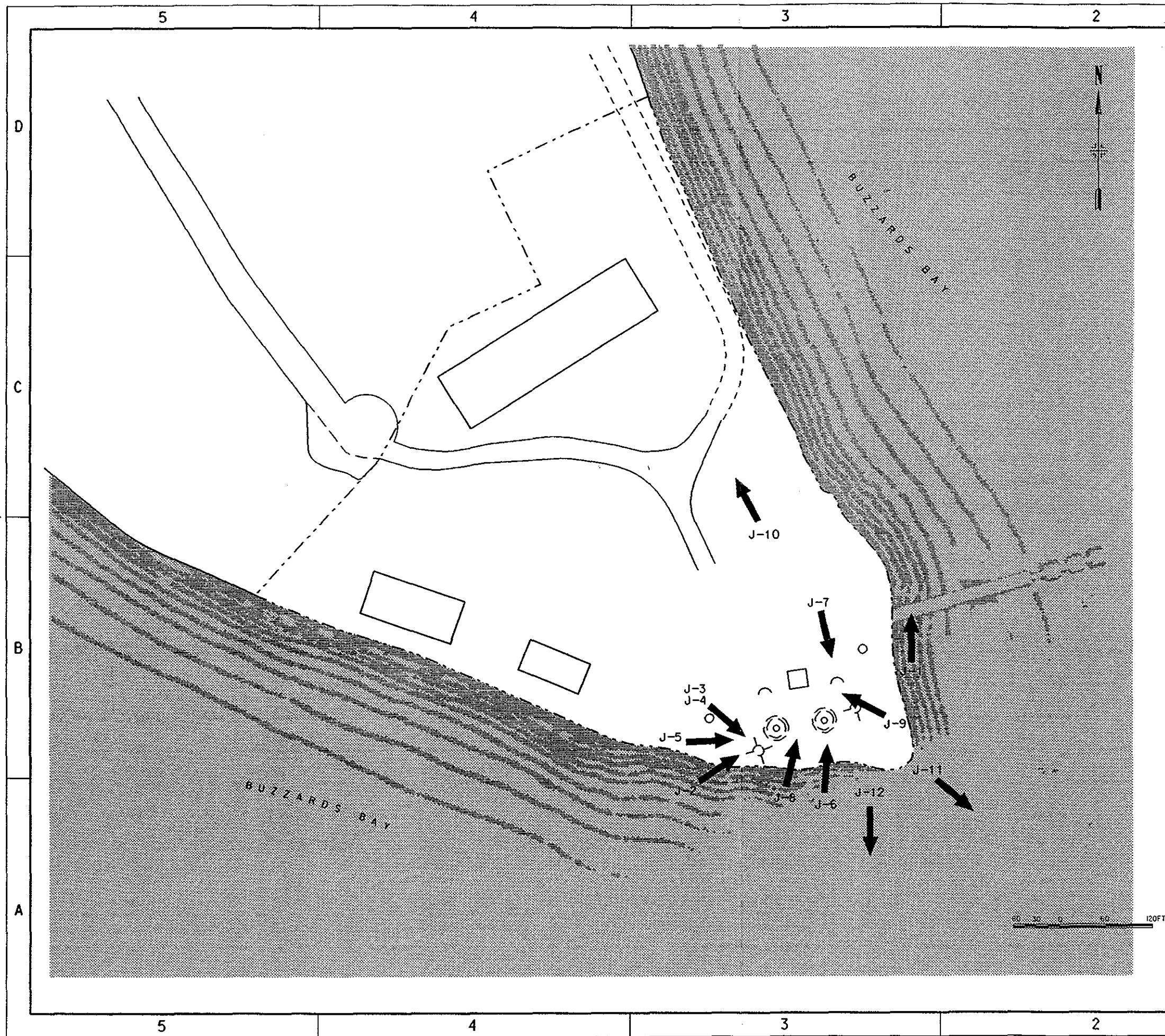
-  AREA C - 90mm TRAINING IMPACT AREA
-  AREA C - 155mm TRAINING IMPACT AREA
-  AREA C - 90mm & 155mm TRAINING IMPACT AREA
-  AREA D - FIELD OF FIRE (COMBAT ONLY)

Revisions			
Symbol	Description	Date	Approved

Project Manager: <b>E.L.P.</b>		 <b>BUTLER POINT AMTB BATTERY</b> <b>MARION, MASSACHUSETTS</b>	
Technician: <b>J.D.T./W.B./C.A.K.</b>		<b>PROJECT AREAS C AND D</b>	
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 10/24/1968/10/24/1968



**LEGEND:**

- SITE BOUNDARY
- ⊙ 155mm PANAMA MOUNT
- ⊙ 90mm FIXED MOUNT
- 90mm MOBILE MOUNT
- BATTERY COMMANDER STATION
- AMMO STORAGE
- BARRACKS
- ← PHOTO LOCATION

NOTE: LOCATIONS OF 90mm MOBILE MOUNTS, BATTERY COMMANDER STATION, AND AMMO STORAGE ARE APPROXIMATE (SEE DOC 1-2)

Revisions			
Symbol	Description	Date	Approved

Project Manager: <b>R.L.P.</b>		BUTLER POINT AMTB BATTERY MARION, MASSACHUSETTS	
Technician: <b>J.D.T.A.W.S.C.A.K.</b>		<b>PHOTO LOCATIONS</b>	
Checked by: <b>M.J.C.</b>		Solicitation Number:	
Reviewed by: <b>D.J.H.</b>		Sheet reference number:	Sheet of
Approved by:		Drawing Code:	Sheet of